A REVISION OF THE GENUS *NEOZEPHYRUS* SIBATANI AND ITO (LEPIDOPTERA : LYCAENIDAE)

BY

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A REVISION OF THE GENUS *NEOZEPHYRUS* SIBATANI AND ITO (LEPIDOPTERA : LYCAENIDAE)

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INTRODUCTION

THE genus *Neozephyrus* was originally separated from *Thecla* (*Zephyrus*) by Sibatani and Ito (1942, *Tenthredo: Acta entomologica* **3** [4]) with *taxila* Bremer selected as the type species of the genus. The two authors dealt only with the species occurring in Japan, Korea and Formosa and they included the following in their new genus ; *hecale* Leech, *taxila* Bremer, *coruscans* Leech, *hisamatsusanus* Nagami and Ishiga, *taiwanus* Wileman, *scintillans* Leech, *smaragdinus* Bremer, *nishikaze* Araki and Sibatani, *aurorinus* Oberthür, *sanctissimus* Araki and Sibatani, *teisoi* Sonan, *niitakanus* Kano and *ataxus* Doubleday & Hewitson. It is the aim of the present paper to bring together with these the other known species of this genus that occur elsewhere.

The present revision was brought about when the Höne collection of Lycaenidae from China had to be identified and it was found that the specimens under the name *scintillans* in the British Museum (Nat. Hist.) when examined genitalically consisted of no less than five distinct species, two of which had been described meanwhile by Dr. S. Murayama of Osaka from " duplicate " material which he had received in exchange. In order to place these species in their correct position the male genitalia of most of the known species of " *Zephyrus* " have been examined in order to obtain an overall picture. In so doing it has become apparent that, though specifically distinct, most of the species illustrate their relationship with each other and fall into well-defined groups or sections which future revisers may be inclined to elevate to subgeneric or even generic rank.

The true *Neozephyrus* extend into India and Pakistan as far west as the Afghanistan border and along the foothills on the southern side of the main Himalayan range and as far south as Loimwei in E. Burma. The three species, *absolon* Hewitson, *borneanus* Pendlebury and *malayicus* Pendlebury, which occur in Java, Sumatra, Borneo and Malaya respectively are so different genitalically that in the author's opinion it will be necessary to erect a new genus for them : *Austrozephyrus* gen. nov.

Neozephyrus is well represented in the British Museum (Nat. Hist.) mainly due to the collections made by Leech, Oberthür and Tytler, but since many of these were made in relatively restricted areas it is still very difficult to form a general picture in a vast country such as China, where material has been examined from relatively

few isolated localities, so it is quite possible that at some later date when more material becomes available it may be necessary for certain modifications to be made.

Fortunately, where the museum has a large series of specimens of one species, it has been found that there is a general constancy both of external and genitalic characters ; consequently it is reasonable to assume that a single specimen, which exhibits divergences in both types of character, is a representative of a different entity.

All the males of *Neozephyrus* are a brilliant metallic-green which changes to either yellowish-, reddish- or bronze-gold or violet when wet with spirit, in some cases related species having the same colour. The colours in the descriptions are, wherever possible, in agreement with those in Ridgway (*Color Standards & Color Nomenclature*, Washington D.C., 1912) and consideration should be given to the fact that all insects are viewed in normal daylight with the viewer's back to the light source and with the insect held in a vertical plane directly in front of the viewer.

The drawings of the male genitalia were made with the aid of a camera lucida and are all of the same magnification for comparative purposes. The two views shown are the lateral aspect of the whole genitalia and *the ventral view of the left valva while still* in situ, not the more usual internal view of the right valva removed, as it has been found possible to examine and identify with certainty many of the males without dissecting them fully. This is done by brushing the tip of the abdomen to remove extraneous scales and then after wetting with wood naphtha exposing the clasp with a dissecting needle.

There are five forms of the female in this genus and for the sake of brevity Murayama & Sibatani (1943, *Trans. Kansai ent. Soc.* **13** (1), 55) used the letters A, B, AB and O to represent four of these and for the same reason the present reviser has also used these and adding AW to denote the fifth, as follows:

A. Female form with metallic-blue or purple patch in cell and space 1 of fore wing.
B. Female form with orange-red or yellowish patch at end of cell and space 3 of fore wing.
AB. Female form with combination of both A and B forms.
AW. Female form with white replacing orange of the AB form.
O. Female form with unicolorous brown fore wing.

To save space the following common abbreviations are used in the descriptive matter that follows:

F, Fore wing ; H, Hind wing ; gr. c. Ground colour ; sp, Space or interspace ; Un, Underside ; Up, Upperside ; v, Vein.

The measurements given in the descriptions are standardized, the length of the fore wing being measured from base to apex and the width of the border being measured at a point midway between veins 2 and 3.

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A Key to the genera and species groups within the genus "*Neozephyrus*" based on the external characters of the fore wing.

Group 1

1*a* (7) ♂ UpF unlike ♀.
1*b* (6) ♂ UpF brilliant metallic-green with black borders of variable width.
1*c* (5) ♂ UpF with black apex not running inward from costa to cell.
1*d* (4) ♂ Un like ♀ (except gr. c. in certain cases).
1*e* (3) ♂ Up gr. c. not tinged with violet.
1*f* (3*b*) ♂ UnF brown or grey-brown gr. c.
1*g* (3*a*) ♀ UpF with no white patch at end of cell and sp. 3.
1*h* (2) Un with discocellular bars distinct . . . *Neozephyrus scintillans* group

Group 2

2 (1*h*) Un with no discocellular bar, or if present very indistinct
Neozephyrus taxila group

Group 3

3*a* (1*g*) ♀ UpF with white patch at end of cell and sp. 3.
3*b* (1*f*) ♂ UnF silvery-blue-grey gr. c. (with but one exception).
3 (1*e*) ♂ Up gr. c. shot with violet with but few exceptions
} *Neozephyrus birupa* group

Group 4

4 (1*d*) ♂ Un unlike ♀ . . . . . *Neozephyrus ataxus* group

Group 5

5 (1*c*) ♂ UpF with black apex running inward from costa towards cell
Austrozephyrus absolon group

Group 6

6 (1*b*) ♂ UpF deep purple, sapphire-blue or very dark green with broad black borders
Teratozephyrus mandara group

Group 7

7 (1*a*) ♂ UpF like ♀ . . . . . *Teratozephyrus arisanus* group

N.B. The genus *Teratozephyrus* Sibatani (1946, *Bull. Lep. soc. Japan* **1** (3) : 77) (type *arisanus* Wileman) is included in the above key as Sibatani places *hecale* Leech in *Neozephyrus*, not having seen a specimen. The genus includes a number of Indo-Chinese species (not dealt with in this paper) formerly placed in *Thecla* (*Zephyrus*) namely *ziha* Hewitson, *arisanus* Wileman, ssp. *ouvrardi* Riley, ssp. *picquenardi* Oberthür, *hecale* Leech, *melli* Forster, *pavo* de Nicéville, *coelestis* Leech, *courvoisieri* Oberthür, *tayal* Esaki & Shirôzu*, *mandara* Doherty, ssp. *bieti* Oberthür, ssp. *dohertyi* de Nicéville, ssp. *irma* Evans, *icana* Moore, *neis* Oberthür, *vallonia* Oberthür, *forsteri* Esaki & Shirozu*, and *tsangkie* Oberthür (= *doni* Tytler syn. nov.).

* Not examined.

The various numbered groups in the above key can be arranged in the following order according to the formation of the male genitalia :

Uncus—	
Simple	1, 3, 4
Developing	2
Complex	5, 6, 7
Falces—	
Simple	6, 7
Complex	1, 3, 4
Robust	2
Missing	5
Aedeagus—	
Spurred	2
Unspurred	1, 3, 4, 7
Bent or twisted	5, 6

As will be seen by the above table the *taxila* group, i.e. the true *Neozephyrus*, is quite distinct genitalically and at the time of writing the author understands from Dr. T. Shirôzu of Kyushu University that the groups within *Neozephyrus* will probably be raised to generic rank when his studies are completed.*

A KEY TO THE SPECIES

Group 1

Falces long and hooked with well-spurred " elbow " (see Fig. 1).

a(bcd) : Valva with lower apical lobe enlarged as in *aurorinus* Oberthür (see Text-fig. 1).

1	(2*a*)	UnH with orange ocellus and tornal spot confluent and almost filling sp. 1*c* at margin . . . . . *aurorinus* Oberthür
2*a*	(1)	UnH not as 1
2	(3*a*)	♂ F very pointed at apex (see Pl. 8, fig. 48). ♂ UpF very broad border as H (2·5 mm.) . . . *sikkimensis* sp. n.
3*a*	(2)	♂ F not very pointed at apex.
3*b*	(5*a*, 7)	♂ UpF border as H, narrow (·5–·75 mm.).
3	(4)	♂ UpF border widening sharply at apex . . . *nigroapicalis* sp. n.
4	(3)	♂ UpF border not widening sharply at apex. α From Indian region . . . . . *kabrua* Tytler β From Formosa . . . . . ssp. *niitakanus* Kano
5*a*	(3*b*, 7)	♂ UpF border as H, broad (1–2 mm.).
5	(6)	♂ UpF border 1 mm. . . . . *scintillans* Leach
6	(5)	♂ UpF border 2 mm. . . . . *watsoni* Evans
7	(3*b*, 5*a*)	♂ UpF border not as H but narrower (F 1 mm., H 1·5 mm.) *letha* Watson
8	(9, 10)	♂ UpF border narrow (·5 mm.) . . . . . *teisoi* Sonan
9	(8, 10, 11)	♂ UpF border broad (1·5 mm.) . . . . . *vittatus* Tytler
10	(8, 9, 11)	♂ UpF border very broad (2·5 mm.) . . . . *marginatus* sp. n.
11	(8, 9, 10)	♂ UpF border extremely broad (3 mm.) . . . . *zoa* de Nicéville

* Since going to print the important paper by Shirôzu and Yamamoto (1956, *Sieboldia* **1**, (4)) has been published in which the authors have described the new genus *Chrysozephyrus* as distinct from *Neozephyrus* which contains many of the species dealt with in this paper in 'Groups' 1, 3 and 4. They also described one new species, *tienmushanus*, which has been included in the present paper under its correct name to prevent publishing a synonym.

b(*acd*) : Valva with lower apical lobe reduced and shaft developing as in *sandersi* sp. n. (see Fig. 13).

1 (2*a*) ♂ UpF with black border extremely broad (3–4 mm.) . . . *tytleri* sp. n.
2*a* (1) ♂ UpF with black border narrower (under 3 mm.)
2 (3*a*) ♂ UpH with blue marginal line at base of tail . . . *sandersi* sp. n.
3*a* (2) ♂ UpH without blue marginal line at base of tail.
3 (4) ♂ UpF length 20 mm., border 1 mm. . . . *intermedius* Tytler
4 (3) ♂ UpF length 21 mm., border 1·5 mm.
α ♂ UnH with gr. c. not darker inwardly of postdiscal " W ".
From Chinese region . . . . . *desgodinsi* Oberthür
β ♂ UnH with gr. c. darker inwardly of postdiscal " W ".
From Indian region . . . . . ssp. *dumoides* Tytler

c(*abd*) : Valva with no lower apical lobe and shaft extended to form large hook as in *duma* Hewitson (see Fig. 17).

1*a* (5) ♂ UnH with no orange in margin of sp. 1*c*.
1 (2*a*) ♂ UnF with postdiscal line broadly marked with darker inwardly
duma Hewitson
2*a* (1) ♂ UnF with postdiscal line narrowly marked with darker inwardly.
2 (3*a*) ♂ UpF with black border of medium width (1·5 mm.)
tatsienluensis Murayama
3*a* (2) ♂ UpF with black border narrow (1 mm. or under).
3 (4) ♂ Un gr. c. unicolorous brown . . . . *nishikaze* Araki & Sibatani
4 (3) ♂ Un gr. c. greyish-brown, paler between postdiscal and submarginal lines . . . . . *yunnanensis* sp. n.
5 (1*a*) ♂ UnH with orange markings extending to near margin of sp. 1*c*.
α ♂ UpH with marginal line at base of tail absent
smaragdinus Oberthür
β ♂ UpH with marginal line at base of tail present
ssp. *sikongensis* Murayama

d(*abc*) : Valva with enlarged lateral " shelf " (see Fig. 22).

1*a* (4*a*) Un with discocellular bars distinct.
1*b* (3) ♂ UpF black border narrow (·75 mm.).
1 (2) ♂ Up gr. c. blue-green . . . *tienmushanus* Shirôzu & Yamamoto
2 (1) ♂ Up gr. c. bronze-green . . . . . *chinensis* sp. n.
3 (1*b*) ♂ UpF black border very broad (2·5 mm.) . . . *souleana* Riley
♂ UpF black border narrower (2 mm.) . . . *angustimargo* ssp. n.
4*a* (1*a*) Un with discocellular bars indistinct.
4 (5) ♂ Up reflects yellowish bronze when wet.
From China . . . . . *disparatus* sp. n.
♂ UpF border very narrow (·5 mm.).
From Formosa . . . . . *pseudotaiwanus* ssp. n.
From Assam . . . . . *pseudoletha* ssp. n.
♂ UpF border broader (1 mm.).
From Sikkim . . . . . *interpositus* ssp. n.
5 (4) ♂ Up reflects violet when wet . . . . . *rarasanus* Matsumura

Group 2

Falces very robust and not heavily spurred at " elbow " or hooked at tip (see Fig. 27).

1 (2*a*) ♂ Up reflects yellow when wet.
α ♂ UpF border very narrow (·25 mm.). From Formosa
mushaellus Matsumura
β ♂ UpF border broader (1 mm.). From China. ssp. *rileyi* Forster

2*a* (1) ♂ Up reflects violet when wet.
2 (3*a*) ♂ UnH postdiscal line in form of " V " . *hisamatsusanus* Nagami & Ishiga
3*a* (2) ♂ UnH postdiscal line in form of " W ".
3 (4*a*) ♂ UpH with blue at base of sp. 8 . . . . . *suroia* Tytler
4*a* (3) ♂ UpH without blue at base of sp. 8 . . . . .
4 (5*a*) ♂ UnF with postdiscal line not straight. . . . . *dubernardi* Riley
5*a* (4) ♂ UnF with postdiscal line straight.
5*b* (8) ♂ UpF very broad border (over 1·5 mm.) not of even width.
5*c* (7) ♂ UpF border not widening sharply at v. 3.
5 (6) ♂ UpH blue marginal line at base of tail absent . . . *coruscans* Leech
6 (5) ♂ UpH blue marginal line at base of tail present . . *helenae* sp. n.
7 (5*c*) ♂ UpF border widening sharply at v. 3 . . . *taiwanus* Wileman
8 (5*b*) ♂ UpF narrower black border (under 1·5 mm.) of even width.
α Small, Un grey, occurring north of Lat. 42 N. approximately. *taxila* Bremer
β Large, Un brown, occurring south of Lat. 42 N. approximately. ssp. *japonica* Murray

Group 3

1*a* (9) H tailed.
1*b* (7*a*) UnH discal band straight and continuous from v. 2 to costa.
1 (2*a*) Un gr. c. grey-brown not silver (except some Nepalese specimens).
UnH orange and black spots at tornus and sp. 2 very prominent.
♂ UpF border broad (2 mm.) H border as F . . . *birupa* Moore
2*a* (1) Un gr. c. bluish-silver.
2*b* (5a) UnH orange spots at tornus and sp. 2 absent.
2 (3*a*) ♂ UpH border (1·5 mm.) narrower than F (2 mm.) . *bhutanensis* sp. n.
3*a* (2) ♂ UpH border as F(1–1·25 mm.).
3 (4) ♂ UpH border not irrorated with blue . . . *triloka* Hannyngton
4 (3) ♂ UpH border irrorated with blue . . . . *jakamensis* Tytler
5*a* (2*b*) UnH orange spots at tornus and sp. 2 present.
5 (6) ♂ UpH border as F (1·5 mm.) not irrorated with blue . . *syla* Kollar
6 (5) ♂ UpH border (1·25 mm.) narrower than F (1·5 mm.) irrorated with blue in many specimens . . . . . *assamicus* Tytler
7*a* (1*b*) Not as 1*b*.
7 (8) UnH discal band irregular and bowed out opposite cell *kirbariensis* Tytler
8 (7) UnH discal band irregular and bowed in opposite cell . . *paona* Tytler
9 (1*a*) H tailless . . . . . *khasia* de Nicéville

Group 4

1 (2*a*) ♂ UpF with black border broad (1·25–2 mm.) widening conspicuously at apex . . . . . *ataxus ataxus* Hewitson
2*a* (1) ♂ UpF with black border narrow (·5 mm.) not widening at apex.
2 (3*a*) ♂ UnH brown markings in sub-basal and submarginal areas conspicuous ssp. *zulla* Tytler
3*a* (2) ♂ UnH brown markings in sub-basal and submarginal areas obsolete or nearly so.
3 (4) H tails of normal length . . . . . ssp. *kirishimaensis* Okajima
4 (3) H tails short . . . . . ssp. *yakushimaensis* Yazaki

Group 5

1 (2) ♂ UpF with green gr. c. extending to approximately half the length of costa . . . . . *absolon* Hewitson
2 (1) ♂ UpF with green gr. c. extending to approximately two-thirds the length of costa . . . . . *borneanus* Pendlebury

GROUP 1

Neozephyrus aurorinus Oberthür

(Fig. 1)

Thecla aurorina Oberthür, 1880, *Étud. d'Ent.* **5** : 18.
Thecla brillantina Staudinger, 1887, *Romanoff Mém. sur Lép. réd.* **3** : 30, t. 6, fig. 3*a* ♂, 3*b* ♀.
Thecla aino Matsumura, 1915, *Ent. Mag. Kyoto* **1** : 57, t. 2, fig. 9.

This species was originally described from a female from Askold Is. by Oberthür as an aberration of *taxila*. Matsumura considered the Japanese race as a separate species and described it under the name *aino*. Seitz (*Macrolep. World* **1** : 270, pl. 73*g*) described under the name *jankowskii* two males from between Chang-Yang and Hankow (?) as a new form of *coruscans*. The B.M. (N.H.) possesses three males from Wychang (?) which are slightly larger (23 mm.) than the nominotypical race but otherwise seem to be indistinguishable from it. The genitalia of these are the same as those of *aurorinus* from Askold Is. and Japan.

The male Up reflects bronze when wet. The females belong to the AB and B forms.

DISTRIBUTION. China and Japan.

There is one subspecies from Japan separated by Murayama :

ssp. ***alpinus*** Murayama, 1954, *New Entomologist*, **3** (4) : 34–35.

(= *kansaiensis* Murayama (*ibid.*) teste. Inoue, 1955, *Tyô To Ga* (*Butterflies and Moths*) **6** : 11.)

This subspecies is larger than the nominotypical race from Hokkaido, the black border being broader on the male Up and the female having the orange markings of UpF much larger.

DISTRIBUTION. Chubu and Kanto Districts of Honshu.

Neozephyrus sikkimensis sp. n.

(Figs. 2, 48, 58)

MALE. Frons hairy, black with paler centrally, bordered on either side with white which encircles the eyes ; palpi bluish-white with dorsal and lateral stripes of black, with a mixture of long dark and pale hairs ventrally ; eyes vandyke-brown with cinnamon-buff hairs ; antennae black with narrow white intersegmental rings, tips cinnamon-buff ; thorax brown with very dark bluish-green hairs, paler beneath ; abdomen dark brown paler beneath ; legs dark brown with paler scales on femora and tibiae and with paler intersegmental rings on tarsi.

UpF. Shape triangulate with costa and outer margin only slightly curved ; gr. c. bluish-metallic-green ; blackish-brown border 2·5 mm. broad, of even width extending basad along veins at apex and costa ; inner margin not sharply defined ; fringe fuscous, paler towards tornus ; length 24 mm ; reflects bronze when wet.

UpH. Gr. c. as F ; border as F broadening sharply along costa between v. 6 and 7 and also along hind margin to base in sp. 1*b* ; fringe as F, darker outwardly towards tornus ; no blue marginal line at tornus ; tail blackish-brown with white tip, 5 mm.

UnF. Gr. c. drab ; discocellular bar slightly darker ; postdiscal line irregular, inwardly shaded with drab slightly darker than gr. c.; submarginal line darker at tornus and indistinct at apex, faintly lined on either side with paler drab ; fringe drab, paler at tornus.

UnH. Gr. c. drab ; discocellular bar indistinct ; sub-basal bar indistinct, lined inwardly with white ; postdiscal " W " white, irregular, stepped and curved outwards at v. 7 to costa ; inner submarginal crescents indistinct at apex; submarginal irroration pale then bluish towards ocellus and tornus ; black pupilled ochraceous-orange ocellus in submargin of sp. 2 ; tornal spot blackish, inwardly lined with ochraceous-orange and again with sapphire-blue ; antemarginal line white, indistinct at apex ; margin as gr. c. with paler fringe.

HOLOTYPE MALE. Sikkim, O. Möller, ex coll. Elwes, 1915–207, B.M. Type No. Rh. 16027, in B.M. (N.H.).

PARATYPE MALE. India, ex. coll. Fruhstorfer, B.M. 1933–131, B.M. Type No. Rh. 16028, Gen. No. T. G.H. 1955–151, in B.M. (N.H.).

Superficially this species rather resembles *desgodinsi dumoides* on Up but can at once be separated from this by the Un lacking the deeper shading inwardly of the postdiscals.

FEMALE. Unknown.

DISTRIBUTION. Sikkim.

Neozephyrus nigroapicalis sp. n.

(Figs. 3, 49, 59)

MALE. Frons hairy, blackish-brown with paler median line, on either side lined with whitish which encircles the eyes ; palpi porrect, white, black dorsally and with a black lateral stripe, clothed in black hairs ventrally except for a distinct line of white on inner edge ; eyes brown with cinnamon-buff hairs ; antennae black with narrow white intersegmental rings and tipped with testaceous ; thorax dark brown with bluish-green hairs, paler beneath ; abdomen with bluish-grey hairs, paler beneath ; legs white with scattered brown scales ; tarsi brown with white intersegmental rings.

UpF. Gr. c. metallic-green with narrow black border (·75 mm.) broadening sharply at apex and continuing along costa to v. 12 ; fringe white ; length 22 mm.; reflects bronze when wet.

UpH. Gr. c. as F ; border as F, very slightly broader (1 mm.) ; sapphire-blue line distinct in margin of sp. 1 and 2 ; tail black tipped with white (5 mm.) ; fringe white, darkened outwardly towards tornus.

UnF. Gr. c. drab ; discocellular bar indistinct ; postdiscal line straight between costa and v. 3 then slightly angled in sp. 2, indistinctly shaded inwardly and narrowly with slightly darker drab ; submarginal band broad, hair-brown in sp. 1 and 2 then shading off narrowly towards apex, outwardly edged with white, becoming indistinct towards apex ; antemarginal line white ; margin dark drab ; fringe white.

UnH. Gr. c. as F ; no sub-basal bar ; discocellular bar as F ; postdiscal " W " not straight but stepped slightly in each interspace, white, very slightly shaded inwardly with darker gr. c. ; inner submarginal line bluish-white interrupted by the veins, indistinct at apex ; submarginal line drab, outwardly irrorated with bluish-white ; prominent black pupilled apricot-orange ocellus in sp. 2 almost joined to the tornal spot by a small spot of apricot-orange and an indistinct black line inwardly of the tornal spot and ocellus ; sapphire-blue line basad and inwardly of tornal spot ; white antemarginal line continuous from v. 7 to tornus ; margin drab ; fringe white.

HOLOTYPE MALE. Siao-lou, Chasseurs indigènes du P. Déjean, 1902, ex coll. Oberthür, B.M. 1927–3, B.M. Type No. Rh. 16029, Gen. No. T.G.H. 1955–158, in B.M. (N.H.).

This species is only known from the one specimen and may be distinguished by the black borders on the Up being very narrow, that on the UpF widening sharply at the apex.

FEMALE. Unknown.

DISTRIBUTION. Szechwan.

Neozephyrus kabrua Tytler *comb. nov.*

(Figs. 4, 50, 60)

Zephyrus kabrua Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 128, pl. iv, fig. 41, ♂.

Tytler in his original description wrongly described a female of *duma* Hewitson as the allotype of this species and though he and his collectors must have taken a number of males the true female has remained unknown until the present time. It is described below from the unique specimen presented by D. F. Sanders to the B.M. (N.H.).

FEMALE. Frons hairy, black-brown edged on either side with a fine white line ; eyes hairy, black-brown ; palpi porrect, clothed with black scales on upper surface and white scales on lower, with a mid lateral stripe of black scales and a median line of short dark hairs ; antenna black with narrow intersegmental rings of white, with orange-red tip to club ; thorax and abdomen brown, paler beneath ; legs brownish-white with first and fifth tarsal segments brown.

UpF. AB form ; gr. c. dark brown with two apricot-buff patches, one at the end of cell, the other in sp. 3, the former triangular, the latter lozenge shaped ; metallic-sapphire-blue patch in cell and sp. 1*a*, 1, 2 and 3, that in sp. 1*a* extending to three-quarters the length of the inner margin, that in sp. 1 extending to the submargin, that in sp. 2 with lower point just reaching to half way along v. 2 ; fringes brown ; length 19 mm.

UpH. Gr. c. as UpF slightly darker towards margin and anal lobe, with an irroration of metallic-sapphire-blue scales in lower half of cell and a few at the base of the tail on either side of v. 2 ; a small dark brown patch in the submargin of sp. 2 ; tail dark brown tipped with white ; fringe brown, inwardly paler from v. 3 to tornus.

UnF. Gr. c. brownish-drab, paler towards inner margin; discocellular bar distinct, deep brownish-drab, indistinctly shaded outwardly with yellowish; postdiscal line slightly curved outward from costa to v. 2, very pale drab-grey, bordered inwardly and broadly with deep brownish-drab shading to gr. c., outwardly to the same width with pale purplish-drab; submarginal band deep brownish-drab slightly darker in sp. 1 and 2; submarginal line pale purplish-drab indistinct at apex but more distinct and broadening towards tornus; marginal band deep brownish-drab with margins slightly darker; fringe brownish-drab paler towards tornus.

UnH. Gr. c. brownish-drab darkening slightly towards costa; discocellular bar distinct, deep brownish-drab with a pale purple drab line inwardly; the postdiscal " W " very slightly curved inward between costa and v. 2, a pale purple-drab, inwardly margined with deep brownish-drab shading to gr. c.; the space between the broad deep brownish-drab submarginal line and the " W " pale purple-drab; the submarginal area irrorated with pale purple-drab; a distinct marginal line of this same colour; a prominent black pupilled apricot-yellow ocellus in sp. 2; at tornus inwardly along v. 1 there is a black lunule edged on the concave side with one of apricot-yellow of the same width which is itself inwardly edged with a narrow black lunular mark; the apricot-yellow lunule extends along the hind margin parallel with the lower part of the " W " with a few metallic-blue scales along the inner edge; fringe as UpH; over the whole surface and on the apex of UpF there is a distinct violet iridescence.

NEALLOTYPE FEMALE. NE. India, Assam, Manipur, 6,000 ft. vi.1937, Himalayan Butt. Co. Shillong, B.M. 1956–423, B.M. Type No. Rh. 16030, in B.M. (N.H.).

The male Up reflects bronze when wet. Holotype male in B.M. (N.H.).

DISTRIBUTION. Male specimens in B.M. (N.H.) from Sikkim (O. Möller), Phesima, Naga Hills, 7,500 ft. 21–27.vii.1913, Kabru, Manipur 8,000–8,400 ft. vi.vii.1913. Tytler.

ssp. ***niitakanus*** Kano ***comb. nov.***

(Fig. 5)

Zephyrus niitakanus Kano, 1928, *Taiwansangaku, Taihoku* **3** : 75.
Zephyrus kanonis Matsumura, 1929, *Insecta matsum.* **3** : 101, ♀.

Though the author has not seen the original description Sibatani & Ito in their paper in *Tenthredo* (1942, **3** : 330) on this genus place *kanonis* Matsumura as a synonym of *niitakanus* Kano. The latter is well described in English by Matsumura (1929) and figured in " *Zephyrus* " (1937, **7** : pl. 9 fig. 9 ♀, fig. 10 ♂).

In the male this subspecies is distinguished from the others of this genus by the combination of the following characters: the narrow black border (·5 mm.) hardly widening towards apex of the fore wing, the length of which is 20 mm., the drab-grey gr. c. of the Un which is lighter between the postdiscals and submarginals, and the proximity of the discoidal bar and the postdiscal " W ". When wet with spirit the metallic-yellow-green of the Up turns to a reddish-bronze. The genitalia place this as the Formosan representative of *kabrua*. The female belongs to the A form.

DISTRIBUTION. Formosa, three males from Sankakuho (2) and Horisha (1) in B.M. (N.H.).

Neozephyrus scintillans Leech

(Fig. 6)

Zephyrus scintillans Leech, 1893, *Butterflies of China, Japan and Corea* **2** : 376, pl. xxvii, figs. 10 ♀, 11♂.

Holotype male and allotype female from Chang Yang, C. China in B.M. (N.H.). Apart from the types the B.M. (N.H.) possesses another pair with the same data as the types and three males, one each from Tien Tsuen (Szechwan), Mt. Omi and Wychang (? Weichang, Chihli 42 N., 117 E.). A series from Lingping (Kwangtung), Likiang (N. Yunnan) and West Tien-mu-shan (Chekiang) in the Höne collection has been examined. It has been found necessary to examine the genitalia of the males in most cases since they seem to vary a little individually in genitalia and in external facies. Male specimens from the type locality appear to have the borders of both F and H of the same width (1 mm.) broadening to 2 mm. at the apex of F and having the postdiscals on the Un nearly straight, whereas some specimens from Kwangtung and Chekiang have very slightly broader borders on the Up, the postdiscal part of the " W " on UnH in sp. 2 is in line with the discocellular bar, it then curves round the cell parallel to the margin and is then bent outward again in sp. 7. A female from Chekiang agrees exactly with the allotype, which belongs to the B form. There are also two males in the Höne collection labelled "Asamayama, Japan, 9–10.viii.14, H. Höne," which appear to differ in no way from the Chinese mainland race. If these two specimens are correctly labelled, which would seem very doubtful, then apparently they are the first recorded from Japan.

The male Up reflects bronze when wet.

DISTRIBUTION. Yunnan, Szechwan, Kwangtung, Chekiang, Chihli (?) and Japan (?).

Neozephyrus watsoni Evans *comb. nov.*

(Figs. 7, 51, 52, 61, 62)

Thecla letha watsoni Evans, W. H., 1927, *Identification of Indian Butterflies*. 1st edition, p. 160.

The identification of Indian Butterflies originally appeared in parts in the *Journal of the Bombay Natural History Society* from 1923–26. Later it was printed separately as a book, the first edition being published in 1927. In this edition there was (teste Evans himself) a printer's error for *Thecla letha* Watson, the name Watson being italicized with a small "W" and with a final "i" added. Evans had before him at the time of writing a pair of what he thought were *Thecla letha* from Loimwe, Burma, and gave the following brief description: "Below uniform brown, areas between discal and submarginal lines not conspicuously paler : ♀ above as *ataxus* ". On examination the genitalia have proved these to belong to a distinct species and it is thought advisable to give a fuller description.

MALE. Frons hairy, black with a few white hairs centrally, edged on either side with white which encircles the eyes ; palpi porrect, whitish with black tips, the black extending down either side, clothed with dark hairs ventrally ; antenna black, narrowly ringed intersegmentally with white, club tipped with brown ; thorax and abdomen above brownish-black covered with bronze-green hairs, below covered with whitish hairs ; legs whitish, tarsi black with whitish intersegmental rings.

UpF. Gr. c. metallic-blue-green with black-brown border broadening at apex and extending along costa to v. 11 ; border 2 mm. with rather ill-defined inner margin ; fringes brownish-white paler towards tornus ; length 21 mm.; reflects bronze when wet.

UpH. Gr. c. as F ; border the same width with sapphire-blue line at base of tail in tornal part of sp. 2 and to tornus ; tail black tipped with white ; fringe whitish, edged with black towards tornus.

UnF. Markings very similar to *scintillans* ; gr. c. slightly greyer brown.

UnH. Gr. c. as F ; markings as *scintillans* but with postdiscal arm of " W " bent slightly outwards from v. 5 to costa ; margins distinctly darker than gr. c. contrasting sharply with the white antemarginal line ; ocellus and tornal spots orange.

FEMALE. Frons, palpi and antennae as male ; thorax and abdomen brown above, paler beneath ; legs as male.

UpF. AB form ; gr. c. dark brown (Prout's) ; patch at end of cell and sp. 3 and part of sp. 2 apricot-buff ; cell and base of sp. 1*a*, 1, 2 and 3 sapphire-blue ; border 3·5 mm.; fringe brown, tipped with white ; length 21·5 mm.

UpH. Gr. c. as F paler towards costa, discoidal cell with overlay of sapphire-blue scales ; a scattering of this same colour over the remainder of wing especially in sp. 1 and 2 with an indistinct crescent-shaped submarginal line on either side of v. 2 ; marginal line slightly darker than gr. c.; dark centred apricot-buff patch corresponding to ocellus on Un in sp. 2 visible ; fringe brownish, paler towards tornus ; tail 5 mm., brown tipped with white ; length 22 mm.

UnF. Gr. c. drab, slightly buffish at end of cell corresponding to patch on UpF ; discocellular bar distinct, lined either side with slightly paler colour than gr. c.; postdiscal band white with slightly darker drab inwardly ; fuscous submarginal spots at tornus distinct, edged outwardly with whitish which extends as the submarginal line towards apex ; margin distinct, fuscous ; fringe as UpF.

UnH. Gr. c. as F ; discocellular bar as F ; white " W " edged inwardly with fuscous, its outer arm almost straight except at apex where it is curved slightly inwards ; submarginal crescents irrorated ; black pupilled submarginal ocellus in sp. 2 apricot-buff with tornal spot of same colour extending basad along hind margin ; margin distinct, fuscous inwardly edged with white ; fringe white.

HOLOTYPE MALE. Loimwe (Burma) 5,600, 24.v.23, B.M. 1925–175, B.M. Type No. Rh. 16031, Gen. No. T.G.H. 1955–125 in B.M. (N.H.).

ALLOTYPE FEMALE. Loimwe, 10.vi.22, B.M. 1925–175, B.M. Type No. Rh. 16032 in B.M. (N.H.).

Neozephyrus letha Watson

Zephyrus letha Watson, 1897, *J. Bombay nat. Hist. Soc.* **10** : 664, pl. A, fig. 7.

Watson stated that this species was " described from a single male taken near Tiddim in the North Chin Hills, Burma, in May . . . at an elevation of about 5,000 ft ". The type was stated to be in the de Nicéville collection in Calcutta but was not to be found in 1956. Before the present rearrangement of the collection in the B.M. (N.H.) this name was placed as a subspecies of *scintillans*, but though the figure of the Un has the general appearance of the Un of this species, the very narrow

border of the UpF and the comparatively broad border of the UpH and the inconspicuous discocellular bars on the Un, in the opinion of the author, rather preclude this, and it would seem preferable to leave it as a distinct species until the type specimen has been examined genitalically, if it is still extant, or more material is forthcoming from this part of Burma.

Swinhoe had a male specimen from the Khasia Hills, Assam, which he described and figured in Moore's *Lepidoptera Indica* 1911, **8** : 270, pl. 704, figs. 2 and 2*a* as belonging to this species and though Swinhoe states that in his opinion it agrees with Watson's description exactly except for the somewhat darker underside this last point is in itself a significant difference in the light of observations made on this genus where the gr. c. is a very constant factor. This latter specimen is described below under the name *disparatus pseudoletha* ssp. nov.

DISTRIBUTION. Burma.

Neozephyrus teisoi Sonan

(Fig. 8)

Zephyrus teisoi Sonan, 1941, *Trans. nat. Hist. Soc. Formosa* **31** : 481.
Zephyrus formosanus Esaki, 1932, *Icon. Ins. Japan*, 969, f. 1910 (primary homonym; see Sibatani & Ito (1942)).
Zephyrus esakii Sonan, 1940, *Trans. nat. Hist. Soc. Formosa* **30** : 81 (pre-occupied by *esakii* Umeno for ♀ f. *smaragdinus*, 1937).
Zephyrus sanctissimus Araki & Sibatani, 1941, *Zephyrus* **9** : 94 (syn. Murayama & Sibatani, 1943, *Trans. Kansai ent. Soc.* **13** : 47).

This species is well figured in *Zephyrus*, 1941, **9** : pls. 7 and 8, figs. 3, 7.

In the male it is distinguished from *niitakanus* to which it has a superficial resemblance by the bluer green gr. c. Up ; the white fringe to the apex of the UpF ; the black border of the UpH (1 mm.) being twice as wide as that of UpF (·5 mm.) ; the browner and more contrasty gr. c. of the Un. The Up reflects yellowish-bronze when wet. The female belongs to the B form.

DISTRIBUTION. Formosa.

Neozephyrus vittatus Tytler *comb. nov.*

(Fig. 9)

Zephyrus vittata Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 126, pl. 4, figs. 42, 43.

Holotype male and allotype female in B.M. (N.H.).

This species is at once recognizable by the UnH having a well-developed sub-basal bluish-white line from v. 8 to lower edge of cell, the discocellular line and the post-discal " W " being of the same colour. The male Up reflects bronze when wet. On the UnF of the female which belongs to the B form, there is an orange-buff patch at the end of the cell extending outwards and downwards in sp. 3 and 2 to the submargin.

DISTRIBUTION. Specimens in the B.M. (N.H.) from Kirbari, Naga Hills ; Kabru, Manipur ; and a pair, the male from the eastern frontier of Thibet, the female from Siao-lou, Szechwan both of these being taken by the native collectors of P. Déjean.

Neozephyrus marginatus sp. n.

(Figs. 10, 53, 63)

MALE. Frons, eyes, antennae, thorax and abdomen as *nigroapicalis* mihi; palpi not lined inwardly with white hairs so conspicuously as in the former, legs brown with scattered white scales, tarsi with white intersegmental rings.

UpF. Gr. c. deep metallic-blue-green; border 2·5 mm. broad, widening a little towards apex, ill-defined inwardly with gr. c. extending into it along the veins; fringe inwardly blackish-brown, outwardly white; length 22·5 mm.; reflects bronze when wet.

UpH. Gr. c. as F; border as F; no blue marginal line at tornus; tail black with white tip; fringe inwardly blackish-brown, medially white, outwardly paler brown darkening towards tornus.

UnF. Gr. c. Saccardo's umber; discocellular bar broad, slightly darker than gr. c. lined on either side with a fine white line; postdiscal line irregular, broad, white shaded inwardly and evenly with slightly darker gr. c.; submarginal band sepia in sp. 1 and 2 shading to gr. c. towards apex, very indistinctly lined inwardly and outwardly with whitish; antemarginal line whitish at tornus fading towards apex; margin sepia; fringe inwardly sepia, outwardly whitish.

UnH. Gr. c. as F; sub-basal bar slightly darker than gr. c., lined inwardly with white; discocellular bar as sub-basal; postdiscal line irregular, almost in line with discocellular bar in sp. 2 then bent outwards around this, at v. 7 stepped inwards and bent outwards again to costa; inner submarginal line very indistinct, irrorated with whitish, outer indistinctly irrorated outwardly as far as the white antemarginal line; large black-pupilled ocellus mikado-orange, almost confluent with tornal patch of same colour; fringe sepia lined with white medially, darker towards tornus.

HOLOTYPE MALE. Mo-Sy-Mien (Szechwan), Chasseurs indigènes 1894, ex coll. Oberthür, B.M. 1927–3, B.M. Type No. Rh. 16033, Gen. No. T.G.H. 1955–129, in B.M. (N.H.).

This species is described from the unique holotype and may be separated by the broad black border and white fringes to the UpF and the very brown gr. c. and irregular postdiscal lines of the Un.

FEMALE. Unknown.

DISTRIBUTION. Szechwan.

Neozephyrus zoa de Nicéville *comb. nov.*

(Figs. 11, 54, 64)

Zephyrus zoa de Nicéville, 1889, *J. Bombay nat. Hist. Soc.* 4 (6) : 167, pl. A, fig. 3.

Holotype male said to be in Calcutta, Tytler's supposed female neallotype is in fact a female of *N. desgodinsi* ssp. *dumoides* Tytler in B.M. (N.H.) (see *N. tytleri*).

The original specimen was taken by Mr. A. V. Knyvett on Tiger's Hill, Darjeeling, at 8,000 ft. on 26.vi.1888 and was apparently in the de Nicéville collection in Calcutta but was not to be found when Dr. Norman examined the collection in 1956. This species does not seem to have been taken again in this area and nothing more was

heard of it until Tytler wrote about the specimens from Manipur which he thought to be this species.

However a male specimen has recently been presented to the museum by Mr. F. T. Vallins from the Antram collection which agrees with de Nicéville's description and figures and which differs quite considerably genitalically from Tytler's specimens but which nevertheless was also caught in Manipur, the exact locality not being stated so that now there seems no doubt that Tytler's material represents a distinct species (see under *tytleri* sp. n.)

The male Up reflects only a very dull green when wet.

DISTRIBUTION. Darjeeling (U.P.) and Manipur.

Neozephyrus tytleri sp. n.

(Figs. 12, 55, 56, 65, 66)

Zephyrus zoa de Nicéville, Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 129.

Tytler took a large series of a *Neozephyrus* which he thought to be the preceding species on the summit of Mt. Kabru in Manipur in July. The males differed from *zoa* in not having the black border of the UpF of even width as far as sp. 6 but widening out at v. 4 and Tytler expressed the opinion that he did not consider it advisable to make these specimens a subspecies until more were forthcoming from the Sikkim area. However, now that there is a male specimen in the B.M. (N.H.) also from Manipur which agrees more closely with *zoa* than Tytler's specimens and which differs considerably in its genitalia from his specimens there seems no reason for not elevating these to specific rank.

It may be stated here with regard to the females of the *duma* complex, that Tytler according to his identifications on the back of his data labels frequently misidentified his specimens and could have used no constant characters by which to separate them. This species is a case in point in that for his neallotype of *zoa* he selected a female of *desgodinsi dumoides* though the separation characters he gave in his note are quite correct : " I am however inclined to think that specimens which have the postmedian narrow white bands on both wings very narrow and straight and the terminal area of the hind wing below very sparsely irrorated with pale scales should be assigned to this species ". As well as these characters mentioned by him in the four female specimens that the B.M. (N.H.) possesses from his collection the ochraceous-orange bar at the end of the cell on the UpF extends down to sp. 2 in only one specimen and is distinctly divided into two sections by v. 4, and the discocellular bar on the UnF is not lined outwardly with white.

The male Up reflects a dull greenish-bronze when wet.

HOLOTYPE MALE. N. India, Manipur, vii.1913, W. H. Evans, B.M. 1935–7, B.M. Type No. Rh. 16034, in B.M. (N.H.).

ALLOTYPE FEMALE. Kabru, Manipur, E. 8000, 20.vii.12, Tytler coll., B.M. 1939–614, B.M. Type No. Rh. 16035, in B.M. (N.H.).

DISTRIBUTION. The types together with 32 males and 3 females all from Mt. Kabru, Manipur, 8,000 ft., in B.M. (N.H.).

Neozephyrus sandersi sp. n.

(Figs. 13, 57, 67)

MALE. Frons hairy, black brown with a median line of white hairs, lined on either side with white which encircles the eyes; palpi black dorsally, clothed with white scales and long hairs laterally and darker ventrally; eyes hessian-brown covered with yellowish hairs; antennae black with intersegmental rings of white, tips hessian-brown; thorax and abdomen covered with blackish hairs, those on the thorax having a greenish tinge; legs white, tarsi dark brown with white intersegmental rings.

UpF. Gr. c. metallic-bluish-green; border of even width (2 mm.) only broadening slightly at apex but extending basad a little along the veins and half-way along costa; fringe pale; length 20·5 mm.; reflects bronze when wet.

UpH. Gr. c. as F; border as F widening in sp. 7 to costa; indistinct metallic-blue marginal line on either side of v. 2; tail black with white tip 3·5 mm.; fringe pale at apex darkening outwardly towards tornus.

UnF. Gr. c. drab; discocellular bar darker, indistinctly and finely lined on either side with whitish; postdiscal line white, nearly straight, only slightly bent inwards at v. 4 and hooked outwardly at costa, shaded inwardly with hair-brown which broadens gradually from lower point at v. 2 to costa; between the postdiscal and submarginal lines there is an area slightly paler than gr. c.; submarginal band fuscous in sp. 1 and 2 becoming drab and indistinct towards costa, indistinctly irrorated with whitish; margin fuscous with fine white antemarginal line at tornus; fringe white at tornus darkening towards apex.

UnH. Gr. c. fuscous; disocellular and sub-basal bars slightly darker, inwardly lined with white, the latter more distinctly; postdiscal "W" white, not conjoined with white edge of submarginal line in sp. 2; between postdiscal and submarginal lines drab; submarginal line fuscous shaded inwardly with indistinct white crescents, outwardly irrorated with silvery white; fine white antemarginal line turning to sapphire-blue towards tornus; black pupilled ocellus in sp. 2 apricot-orange; tornus black with apricot-orange patch inwardly and basad along hind margin, this line inwardly edged with brilliant sapphire-blue; fringe white at apex darkening outwardly towards tornus.

HOLOTYPE MALE. Chungthang, EC. Sikkim, 6,000 ft., 11.vi.1944, Native collector for D. F. Sanders, B.M. 1956–423, B.M. Type No. Rh. 16036, Gen. No. T.G.H. 1955–164, in B.M. (N.H.).

PARATYPE MALES. One labelled "Sikkim", June, ex coll. Antram, B.M. 1956–34, B.M. Type No. Rh. 16037, in B.M. (N.H.) and two from the same locality as the holotype, taken on 9.vi.1944 and 16.vi.1944, in the D. F. Sanders collection.

This species is very similar to *vittatus* in general appearance but differs in having broader borders to the Up and not having the sub-basal bar extending to the median vein on the UnH (see Sanders, 1955, *J. Bombay nat. Hist. Soc.* **52**: 825).

DISTRIBUTION. Sikkim.

Neozephyrus intermedius Tytler *comb. nov.*

(Fig. 14)

Zephyrus dumoides var. *intermedia* Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 127.

Described tentatively as a variety of *desgodinsi dumoides* by Tytler without examination of the genitalia. On examination these have proved this to be a genuine species which flies together with other members of the *duma* complex and which though the Up of the male resembles *vittatus* with comparatively narrow borders (1 mm.), the Un resembles that of *desgodinsi dumoides*. The female is very difficult to separate from the latter but it appears to have a paler irrorated line to the dark submarginal area of the UnH thus giving a silvery edge to the black " eyebrow " of the ocellus in sp. 2.

The male Up reflects bronze when wet.

DISTRIBUTION. Kabru, Manipur and Kirbari, Naga Hills, Assam.

Neozephyrus desgodinsi Oberthür *comb. nov.*

(Fig. 15)

Thecla desgodinsi Oberthür, 1886, *Étud. d'Ent.* **11** : 21, pl. vii, fig. 54 ♀.
Zephyrus desgodinsi Oberthür, 1914, *Étud. Lep. Comp.* **9** (2) : 52, pl. clvi, fig. 2148, ♂.

Holotype female and allotype male in B.M. (N.H.).

In the male this species is separated from *duma*, which it closely resembles, by the broader border (2 mm.) on Up, the inner edge of which is not so sharply defined and the black extending more noticeably along the veins near the apex ; on the Un being slightly browner and the postdiscal " W " not broadly edged inwardly with darker brown. The female is not separable from *duma* externally. Apart from the types the B.M. (N.H.) has another pair, the male from Yunnan and the female from Siao-lou. Length of F in male is 22 mm., in female 21 mm.

The male Up reflects bronze when wet.

DISTRIBUTION. W. China, Szechwan and Yunnan.

ssp. *dumoides* Tytler *comb. nov.*

(Fig. 16)

Zephyrus dumoides Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 127, pl. 14, fig. 39.

Holotype male in B.M. (N.H.).

Very similar to the western Chinese race on Up. The Un with much more contrast than *duma* due to the pale areas between postdiscal and submarginal lines of both F and H and the nearly unicolorous dark basal area inward of the postdiscal line of the H.

The male reflects bronze when wet and the F length is 21 mm., in the female 20 mm.

DISTRIBUTION. Sikkim and Manipur.

Neozephyrus duma Hewitson *comb. nov.*

(Fig. 17)

Dipsas duma Hewitson, 1869, *Illustrations Diurnal Lep. Suppl.* **15**, pl. 6, fig. 15.

Holotype male in B.M. (N.H.).

In the male this species can be separated from its nearest relatives by its comparatively large size (22·5 mm. approx.), the golden tinge to the metallic-green gr. c. in many specimens and the border (1·3 mm.) widening only slightly towards the apex of the UpF and the silvery-brown gr. c. of the Un.

Apparently widely distributed and common in several areas. The B.M. (N.H.) has a long series from Sikkim, Darjeeling (U.P.), Bhutan, the Naga Hills, Manipur and one male from Yatung, Thibet. The last differs little from the Indian specimens except that the valva viewed laterally resembles *desgodinsi*. There is another specimen from Li-kiang, N. Yunnan which resembles the Thibetan specimen.

The male Up reflects bronze when wet.

DISTRIBUTION. Sikkim, Darjeeling, Bhutan, Manipur, Thibet and Yunnan.

Neozephyrus tatsienluensis Murayama

(Fig. 18)

Neozephyrus tatsienluensis Murayama, 1955, *Tyô To Ga* (*Butterflies and Moths*) **6** (1) : 2, figs. 7 and 8.

Holotype male in B.M. (N.H.), B.M. Type No. Rh. 16038, Gen. No. T.G.H. 1955–142.

Described from the unique male from the Oberthür collection which was originally placed under the name *scintillans* in the B.M. (N.H.) collection. It was then sent together with another specimen (*smaragdinus* ssp. *sikongensis* Murayama) as being representatives of the former to Dr. S. Murayama who at once recognized them as being distinct and having described them was kind enough to return them to the B.M. (N.H.).

This species is placed next to *duma* because of the similarity of the male genitalia. On external facies however it differs from that species in having the blue marginal line between tornus and sp. 2 distinct and white fringes to the F. The Un differs considerably in not having the deep shading of the postdiscal lines so wide and distinct and the " W " on the H very irregular and stepped inwards between v. 6 and v. 7. Length 21 mm.

The Up reflects yellowish-bronze when wet.

FEMALE. Unknown.

DISTRIBUTION. Szechwan, W. China.

Neozephyrus nishikaze Araki & Sibatani

Thecla nishikaze Araki & Sibatani, 1941, *Zephyrus* **9** : 91, pls. 7 and 8, fig. 1.

Holotype male in coll. Araki.

Apart from the original figure it is also figured by Murayama & Sibatani (1943, *Trans. Kansai ent. Soc.* **13** : pl. 3 (?), fig. 3 ♂; pls. 7 and 8 (?), fig. 5 ♀) and by

Murayama (1955, *Tyô To Ga* (*Butterflies and Moths*) **6** (1) : 2, fig. 5). Through the kindness of Dr. Murayama this latter specimen, a paratype, has been examined as unfortunately the B.M. (N.H.) does not possess a specimen of this species. It has been most difficult to form an opinion as to its exact relationship with other species as the genitalia preparation of this specimen is in Japan. However the one view of the valva figured by Murayama & Sibatani (*ibid*) would seem to place it somewhere within the *duma* complex and the general appearance would confirm this, the disparity between the width of the borders of the Up being F 1·3 mm. and H 2 mm. On the Un this species rather resembles *sikkimensis* or *smaragdinus* ssp. *sikongensis* in tone but the bent postdiscal line at v. 4 of F and the wavy postdiscal of H seem good separation characters in both sexes.

The male Up reflects bronze when wet. The female belongs to the A form.

DISTRIBUTION. Formosa (Mt. Rara, Taihoku Pref.).

Neozephyrus yunnanensis sp. n.

(Figs. 19, 68, 69, 78, 79)

MALE. Frons hairy, brown with a few white hairs centrally, lined on either side with white which encircles the eyes ; palpi black above, white laterally and ventrally with long black hairs below ; eyes brown with whitish hairs ; antennae brownish-black with narrow white intersegmental rings, tips apricot-buff ; thorax with bronze-green hairs above and white below ; abdomen as thorax ; legs white with scattered brownish scales ; tarsi brown with intersegmental rings of white.

UpF. Gr. c. brilliant metallic-green ; border brownish-black, narrow (1 mm.) not broadening at apex ; fringe white ; length 22 mm.; reflects bronze when wet.

UpH. Gr. c. as F ; border blackish-brown, broader than F (1·5 mm.) ; fringe white outwardly brown at tornus ; tail darker brown than border, tipped with white (4 mm.) ; a thin metallic-blue line on either side of tail.

UnF. Gr. c. drab ; discocellular bar darker than gr. c. lined on either side with white ; postdiscal line shaded narrowly and inwardly with darker drab as discocellular bar, irregular, curved inwards at each vein forming a series of crescents ; submarginal line hair-brown towards inner margin in sp. 1 and 2 becoming indistinct towards costa with paler drab outwardly ; antemarginal line very narrow ; fringe white.

UnH. Gr. c. as F ; sub-basal and discocellular bars slightly darker, lined inwardly with white ; postdiscal line white shaded as F, irregular not conjoined with inner white submarginal line in sp. 2 ; submarginal band broadly irrorated with white ; black pupilled cinnamon-buff ocellus in sp. 2 not confluent with tornal patch of same colour ; antemarginal line broad, white ; fringe as F.

FEMALE. Frons, palpi, eyes, antennae as male ; thorax, abdomen and legs browner.

UpF. AB form ; gr. c. blackish-brown with clay-coloured patch at end of cell ; cell and part of sp. 1*a*, 1, 2 and 3 a brilliant sapphire-blue and irrorated with same colour between v. 4 and costa around pale patch at end of cell ; fringe whitish, darker outwardly ; length 20·5 mm.

UpH. Gr. c. as F ; sapphire-blue patch in lower part of cell and base of sp. 2

and extending as far as submargin in sp. 1 ; indistinct blue line at base of tail ; margin darker at ends of veins ; fringe whitish, darker outwardly especially towards tornus where cilia have black tips ; tail blackish-brown with white tip (4 mm.).

UnF. Gr. c. benzo-brown with markings as male except that discocellular bar is not lined with white.

UnH. Gr. c. as F ; markings as male except that there is no sub-basal bar in sp. 7 ; the tornal patch and ocellus in sp. 2 are ochraceous orange, the black pupil of the latter appears to be more trilobate than orbiculate as it does in the male.

HOLOTYPE MALE. Bahand, Yunnan, Reçu du Pére Ouvrard, Missionnaire apostol à Oui-Si ou Wei-Si, Yunnan, Chine, en Janvier 1917, ex coll. Oberthür B.M. 1927–3, B.M. Type No. Rh. 16039, Gen. No. T.G.H. 1954–68, in B.M. (N.H.).

ALLOTYPE FEMALE. Same data as holotype. B.M. Type No.Rh. 16040, in B.M. (N.H.).

PARATYPE MALE. Tse-Kou, R. P. Dubernard 1895, ex coll. Oberthür B.M. 1927–3, B.M. Type No. Rh. 16041, Gen. No. T.G.H. 1954–67, in B.M. (N.H.).

DISTRIBUTION. Yunnan.

Neozephyrus smaragdinus Bremer

(Fig. 21)

Thecla smaragdina Bremer, 1861, *Bull. Acad. Sci. St-Pétersb.* **3** : 470.
Thecla smaragdina Bremer, 1864, *Mém. Acad. Sci. St-Pétersb.* **8** (1) : 25, pl. 3, fig. 5.
Thecla diamantina Oberthür, 1879, *Diag. Lep. Askold*, Rennes, p. 3.

The male type of *diamantina* in B.M. (N.H.).

The male is distinguished by the width of the borders of the Up, being narrow in the F and broad in the H, and the Un having broad white postdiscal lines, that of H being often bent outwards at sp. 7 and with the sub-basal and discocellular bars distinct ; the tornal spot and ocellus in sp. 2 confluent, forming a patch of apricot-buff ; Up reflects bronze-violet when wet.

The female belongs to the B form and is recognizable by the large patch of apricot-buff on the UpF which is more orbiculate than bilobate and the UpH having a tornal spot of the same colour.

The B.M. (N.H.) has a male from Chang Yang, C. China, a series of males and one female from Amur and a series of both sexes from Japan. There appears to be no noticeable difference between the specimens from these areas except that the female from Amur has a much smaller patch of buff at the end of cell of UpF. Specimens from Honshu have been divided into two subspecies by the Japanese.

DISTRIBUTION. C. China, Amur and Japan.

ssp. ***sikongensis*** Murayama

(Fig. 20)

Neozephyrus sikongensis Murayama, 1955, *Tyô To Ga* (*Butterflies and Moths*) **6** (1) : 3, figs. 9, 10.

Holotype male in B.M. (N.H.), B.M. Type No. Rh. 16042.

This subspecies was named from a male from Ta-tsien-lou in the Oberthür collection and may be separated by the Up having the appearance of the nominotypical race

with the same disparity in width of the black borders of F and H (F ·75 mm., H 2 mm.) but having a metallic-blue marginal line at the base of tail present and on the Un the pale inner submarginal line of H not so wavy as in *smaragdinus smaragdinus*.

The Up reflects bronze when wet. The B.M. (N.H.) has three other specimens which have exactly the same data as the holotype.

DISTRIBUTION. Szechwan, W. China.

ssp. ***odakae*** Watari, 1929, *Zool. Mag. Tokyo* **41** : 187, figs. 10, 15.

(=*luxurians* Murayama 1953, *Tyô To Ga* (*Butterflies and Moths*) **4** : 2.)

According to Sibatani this subspecies has the female with large orange spots on UpF and with a spot also on UpH in tornal area rather more extreme than that figured by Esaki (1935, *Zephyrus* **6** : pl. 13, fig. 10).

DISTRIBUTION. Central Honshu (Nagano Pref.).

ssp. ***amoenus*** Murayama

Neozephyrus smaragdinus ssp. *amoenus* Murayama, 1954, *New Entomologist* **3** (4) : 34.

According to Murayama this differs from *odakae* in being somewhat smaller and lighter on the Un and with the margins of the male Up slightly narrower, and the female UpF having the orange marking generally smaller.

DISTRIBUTION. West Honshu (Kansai district).

There is a form of the female, *esakii* Umeno (1937, *Bull. Umeno ent. Lab. Kurume* **4** : 28, pl. 6, fig. 6) which according to Murayama and Sibatani (1943, *Trans. Kansai ent. Soc.* **13** : 55) belongs to the O form.

Neozephyrus tienmushanus Shirôzu & Yamamoto

(Figs. 22, 70, 71, 80, 81)

Chrysozephyrus tienmushanus Shirôzu & Yamamoto, 1956, *Sieboldia* **1** (4) : 387.

MALE. Frons dark brown with few white hairs medially, lined on either side with white which encircles the eyes ; palpi blackish-brown, striped with white inwardly and outwardly, tapering from base to apex of first joint, ventrally with a mixture of black and white hairs ; eyes dresden-brown covered with warm-buff hairs ; antennae black with white intersegmental rings, tips zinc-orange ; thorax dark brown covered with bronze-green hairs, paler beneath ; abdomen brown, paler beneath ; legs whitish with scattered brown scales, tarsi black with white intersegmental rings.

UpF. Gr. c. brilliant metallic-green ; border black, narrow, of even width (1 mm.) ; fringe white ; length 22 mm.; reflects bronze when wet.

UpH. Gr. c. as F ; border as F ; fringe as F, darker outwardly towards tornus ; tail black tipped with white (5 mm.) ; indistinct blue marginal line at base of tail.

UnF. Gr. c. drab ; discocellular bar hair-brown, broad, lined on either side with white ; postdiscal line almost straight, broad, white shaded inwardly and broadly with hair-brown ; submarginal line hair-brown at tornus narrowing and becoming paler towards apex, outwardly lined with paler drab ; marginal line whitish becoming indistinct at apex ; fringe white.

UnH. Gr. c. as F ; sub-basal bar white shaded outwardly with slightly darker gr. c.; discocellular bar distinct, shaded inwardly with white ; postdiscal line almost straight between v. 2 and costa, only slightly bent outwards round cell, white shaded inwardly with hair-brown fading to gr. c.; submarginal band consisting of two lines of crescents, the inner narrow and whitish, the outer broader and irrorated with bluish white ; black pupilled ochraceous-orange ocellus in sp. 2 not quite confluent with tornal patch of same colour which is lined inwardly with black and then sapphire-blue ; tornal spot black ; distinct white marginal line.

Female. Frons, palpi, eyes, antennae and legs as male, thorax and abdomen Prout's brown, paler beneath.

UpF. B form ; gr. c. Prout's brown, small patch of ochraceous-orange at end of cell and another smaller and more indistinct towards the middle of sp. 3 ; fringe brownish, paler towards apex and tornus ; length 22 mm.

UpH. Gr. c. as F slightly paler towards costa ; fringe whitish outwardly brown ; tail as gr. c. tipped with white (6 mm.) ; blue marginal line reduced to a small spot on either side of v. 2.

UnF. Gr. c. buffy-brown paler towards inner margin, discocellular bar darker, edged inwardly with white which extends in a curve basad along subcostal vein as far as v. 11 very indistinctly edged outwardly with white ; postdiscal line distinct, white, stepped slightly inwards at v. 4 and hooked outwards at costa, edged inwardly and broadly with darker buffy-brown which shades to gr. c.; submarginal band clove-brown in sp. 1 and 2 fading to gr. c. towards apex, outwardly edged with whitish which becomes indistinct towards costa as does the marginal line ; margin slightly darker than gr. c.; fringe as UpF.

UnH. Gr. c. as F sub-basal bar white, curved inward from v. 8 to middle of cell then sharply outwards to v. 2 ; discocellular bar indistinctly edged inwardly with white ; postdiscal line white, curved slightly inwards from v. 2 to costa ; submarginal band as gr. c. with whitish crescents inwardly and irrorated outwardly and broadly with same colour ; ocellus and tornal patch apricot orange ; marginal line white becoming indistinct towards apex ; tail black tipped white ; fringe as UpH.

Neallotype female. West Tien-mu-shan, Prov. Chekiang, 12.vii.1932, H. Höne in Zoologische Forschungsinstitut, Bonn.

This species may be distinguished in the male by its size and narrowness of the Up borders and in the female by the smallness of the ochraceous patches on the UpF and the unusual discoidal and sub-basal bars on the Un.

Distribution. Chekiang, E. China.

Neozephyrus chinensis sp. n.

(Figs. 23, 72, 73, 82, 83)

Male. Frons, palpi, eyes, antennae, thorax and abdomen and legs as *tienmushanus*

UpF. Gr. c. metallic-green with a rather bronze-violet tint in certain lights ; border black (1·2 mm.) hardly widening at apex ; fringe brownish, outwardly white. Length 20 mm.

UpH. Gr. c. as F, border as F but very slightly wider, blue marginal line in sp. 1 and 2 ; fringe as F ; tail black tipped with white (4 mm.).

UnF. Gr. c. buffy-brown ; discocellular bar darker, lined on either side with white ; postdiscal line straight, silvery white edged inwardly with darker gr. c. of same width ; submarginal band clove-brown in sp. 1 and 2 fading to gr. c. towards apex, lined outwardly with white; marginal line white fading towards apex ; fringe brown outwardly white.

UnH. Gr. c. as F ; sub-basal bar slightly darker inwardly, edged with silvery white ; discocellular bar as sub-basal ; postdiscal line distinct, bent inwards in line with discocellular bar in sp. 2 and then outwards and almost straight to costa ; submarginal band as gr. c., lined inwardly with silvery crescents becoming indistinct towards apex, outwardly irrorated with broad silvery crescents which are bluish towards tornus ; black pupilled rufous ocellus in sp. 2, and tornal patch confluent inwardly of sp. 1*c* ; marginal line silvery ; fringe as F ; tail as F.

FEMALE. Frons, palpi, eyes, antennae and legs as male, thorax and abdomen sepia, paler beneath.

UpF. AB form ; gr. c. sepia, metallic-blue in cell and sp. 1*a*, 1 and extreme base of sp. 2 and small pinkish-cinnamon patches at end of cell and sp. 3 as in *tienmushanus* fringe white ; length 18·5 mm.

UpH. Gr. c. as F with a few blue scales scattered in lower part of cell and inwardly to a slightly darker spot corresponding to the pupil of the ocellus in submargin of sp. 2 of Un and on either side of v. 2 in the margin ; fringe brownish inwardly and outwardly, with whitish medially, darker towards tornus which is black ; tail black with white tip (4 mm.).

UnF. Gr. c. a little darker than male but otherwise similar.

UnH. As UnF.

HOLOTYPE MALE. Se-Pin-Lou-Chan, Ya Tcheou, chasseurs indigènes 1893, ex Oberthür coll. B.M. 1927–3, B.M. Type No. Rh. 16043, Gen. No. T.G.H. 1954–66, in B.M. (N.H.).

ALLOTYPE FEMALE Tien-Tsuen; chasseurs indigènes du P. Dèjean, 1901, ex Oberthür coll., B.M. 1927–3, B.M. Type No. Rh. 16044, in B.M. (N.H.)

EIGHT PARATYPE MALES : (1) Thibet, Tsekou, R. P. Dubernard, ex coll. Oberthür B.M. 1927–3, (2) " China " J. Gurney-Barclay coll. B.M. 1938–719, (5) Wychang, Joicey Bequest B.M. 1934–120, in B.M. (N.H.).

This species is very similar in appearance to *scintillans* but it is closely related to *tienmushanus* having the same form of genitalia. The genitalia of all the males have been examined and they show very slight variation especially amongst the Wychang specimens ; the facies of these differs from the Szechwan specimens in having slightly narrower borders and a more "brassy" tinge to the gr. c. which does not reflect brilliant violet when wet but has a more "bronzy" tone, but there is, however, one specimen which matches the Szechwan specimens exactly except for the reflection when wet which may illustrate that the change of colour may be due to a genetical difference or to a difference in climate or pabulum of the two localities. But for this specimen the Wychang examples would appear to represent a subspecies.

DISTRIBUTION. Szechwan and Wychang, China.

Neozephyrus souleana Riley *comb. nov.*

(Figs. 24, 74, 84)

Thecla souleana Riley, 1939, *Novit. zool.* **41** : 357.

Holotype male in B.M. (N.H.).

The B.M. (N.H.) apart from the holotype has three other males all from the type locality, Yarégong, Szechwan, W. China. It may be separated by the width of the borders of the Up being 2·5–3 mm. and having white fringes, and on the Un being a unicolorous buffy-brown. In the original description the length of the fore wing was said to be 15 mm. compared with *coruscans* 18 mm., both are actually 5 mm. longer than as stated, being 20 mm. and 23 mm. respectively.

THE FEMALE is unknown.

The male Up reflects violet when wet.

DISTRIBUTION. Szechwan.

ssp. *angustimargo* ssp. n.

(Figs. 75, 85)

There are a male and two female specimens from Yunnan in the B.M. (N.H.) and a series of eight males from the same province in the Höne collection. The genitalia of all the males have been examined and they appear very similar to *souleana* but externally the insects differ in that they have narrower borders (1·5 mm.) and brown fringes which are paler towards the tornal areas of the fore wings but on the Un they resemble *souleana*. The two females resemble *chinensis* in size and coloration on the Up and belong to the AB form, but on the Un however they match their males. These apparently belong to a distinct subspecies and I propose the above name for them.

The male Up reflects violet when wet.

HOLOTYPE MALE. Tsekou, 1900, R. P. J. Dubernard, ex coll. Oberthür, B.M. 1927–3, B.M. Type No. Rh. 16045, in B.M. (N.H.).

ALLOTYPE FEMALE. Tsekou, 1895, R. P. J. Dubernard, ex coll. Oberthür, B.M. 1927–3, B.M. Type No. Rh. 16046, in B.M. (N.H.). This specimen was figured as *Zephyrus zotelistes* Oberthür in *Etud. Lép. Comp.* 1913–14, **9** : pl. 254, fig. 2147.

PARATYPE FEMALE. Thibet, Tchang-kou, Chasseurs chinois, été 1892, ex coll. Oberthür, B.M. 1927–3, B.M. Type No. Rh. 16047, in B.M. (N.H.).

PARATYPE MALES. Seven from Li-kiang Prov., N. Yunnan (4) 14, (1) 15, (1) 16, (1) 20.vii.1935, H. Höne, in Höne collection, Bonn.

There is a male in the Höne collection that was taken with the paratype males which differs in no way from them in general appearance but the genitalia are abnormal being not so robust and having the falces more hooked (Fig. 25). Apart from these genitalic differences there seems to be no other character by which this specimen may be separated so that it would be better to leave it undescribed so that if at some later date more specimens are forthcoming with this same genitalic formation then they may be considered as representing an undescribed species.

DISTRIBUTION. Yunnan.

Neozephyrus disparatus sp. n.

(Figs. 26, 76, 86)

MALE. Frons, palpi, etc. as *yunnanensis*.

UpF. Gr. c. metallic-blue-green with black-brown border (1·3 mm.); fringe inwardly black-brown, outwardly white; reflects yellowish-bronze when wet.

UpH. Gr. c. as F; border broader (2·3 mm.) indistinct metallic-blue marginal line on either side of v. 2; fringe as F but outwardly darker towards tornus; tail black, tipped with white (5 mm.); length 21 mm.; reflects yellowish-bronze when wet.

UnF. Gr. c. pale drab; discocellular bar not distinct; postdiscal line slightly wavy, narrow, white inwardly lined with darker gr. c.; submarginal band almost reduced to the two dark spots in tornal area, that in sp. 1 nearly split in two by submedian fold, that in sp. 2 being more rectangular in shape; marginal line white, only visible at tornus, becoming indistinct above sp. 2; fringe as UpF.

UnH. Gr. c. as F; discocellular bar as F; postdiscal line a little wider than that of F but otherwise similar; submarginal band irrorated with bluish-white scales in form of two lines of crescents, the inner narrower and more distinct than the broader, more diffuse outer line; black-pupilled apricot-orange ocellus in sp. 2 not touching tornal patch of same colour, sapphire-blue line inwardly of ocellus and patch; tornus black; distinct white marginal line; fringe as UpH.

HOLOTYPE MALE. Reçu de la Mission catholique de Weisi, Yunnan en 1923 (Chasse de 1922) ex Oberthür coll. 1927–3, B. M. Type No. Rh. 16048, in B.M. (N.H.).

PARATYPE MALES. Three (1) Tsekou, Père Ouvrard 1914, B.M. Type No. Rh. 16049; (1) Tsekou, P. Dubernard 1903; (1) Yunnan, Tsekou, Bords du Mékong, R. P. Valentin, Chasse de 1920, B.M. Type No. Rh. 16050, Gen. No. T.G.H. 1954–74. All ex Oberthür coll. 1927–3 in B.M. (N.H.). This species resembles *tatsienluensis* on Up but has broader borders to the H and may be separated from that species by the Un having the discocellular bars barely visible.

FEMALE. Unknown.

DISTRIBUTION. Yunnan, W. China.

ssp. ***pseudotaiwanus*** ssp. n.

The male is similar to ssp. *interpositus* in size (19 mm.) but has very narrow borders to the wings (F ·4 mm., H 1 mm.) and white fringes. The Un is the same as *disparatus disparatus*. The female belongs to the AB form and on the Up resembles *chinensis* but with the sapphire-blue in sp. 2 extending outwards nearly as far as that in sp. 1 of F, and having only a few blue scales in cell and sp. 1 of H. The blue marginal line on either side of v. 2 distinct. Un gr. c. buffy-brown with markings similar to male.

As the name would suggest this subspecies has been confused with *mushaellus* (nec *taiwanus* Wile.) until the present, due no doubt to the shortage of Formosan material of this genus in Britain and the fact that no comparison of material from this area with the allotype of *taiwanus* has ever been made. Through the kindness of

Dr. S. Murayama and other Japanese workers the shortage of material has at last been partly rectified and consequently it has been possible to make critical comparisons with the types in the collection here.

This subspecies may be separated from *mushaellus* in the male by its smaller size (19 mm. compared with 22·5 mm.), the golden-green gr. c. of the Up, and the broader border to the UpH (1 mm. compared with ·5 mm.). The submarginal black spots on UnF are three in number, a twin in sp. 1 and a single one, slightly paler, in sp. 2; *mushaellus* on the other hand has a large spot in sp. 1 and a very indistinct smear of darker colour in sp. 2.

The figure in *Bull. lep. Soc. Japan*, 1946, **1** (3): 86 was reprinted in *Tyô To Ga* (*Butterflies and Moths*) 1951, p. 21. Though originally a poor reproduction it certainly represents a male *pseudotaiwanus* and that in *Trans. Kansai ent. Soc.*, 1943, **13** (1): pl. 7–8 (?), fig. 1 is a good figure of the female.

The male Up reflects yellowish-bronze when wet.

HOLOTYPE MALE. Mareppa, Formosa, 17.v.1942, ex Murayama coll., B.M. 1956–375, B.M. Type No. Rh. 16053 in B.M.(N.H.).

ALLOTYPE FEMALE. Sankakuho, Formosa (Pref. Taichu) 20.v.1942. In S. Murayama collection.

PARATYPE MALES. (1) Sankakuho, Formosa (Pref. Taichu) 28.v.1942. In S. Murayama collection. (1) Sankakuho, Formosa (Pref. Taichu) 20.v.1942. In S. Murayama collection. (1) Hakku, Formosa 23.v.1942, ex coll. Murayama, B.M. 1955–560, B.M. Type No. Rh. 16054, Gen. No. T.G.H. 1955–153, in B.M. (N.H.).

DISTRIBUTION. Formosa.

ssp. ***pseudoletha*** ssp. n.

Ruralis letha Watson, Swinhoe 1911, in Moore's *Lepidoptera Indica* **8**: 270, pl. 704, figs. 2 and 3.

Named from the unique specimen figured and described by Swinhoe from the Khasia Hills, Assam and which was thought by him to represent *letha*. Unless Watson's original figure is hopelessly inaccurate there seems to be no reason why this specimen should not be considered distinct (see *letha*). The genitalia place it at once with *disparatus*. Compared with the Yunnan race it is smaller, being only 18·5 mm., the borders on Up are narrower (F ·5 mm., H 1·5 mm.), the Un is slightly browner, the discocellular bars are a little more distinct and the fringes are brown.

The Up reflects yellowish-bronze when wet.

HOLOTYPE MALE. Assam, Khasia Hills, Joicey Bequest, Brit. Mus. 1934–120, B.M. Type No. Rh. 16051, Gen. No. T.G.H. 1955–173, in B.M. (N.H.).

DISTRIBUTION. Assam.

ssp. ***interpositus*** ssp. n. (Figs. 77, 87)

Named from the unique male taken by Antram in Sikkim and presented to the B.M. (N.H.) by Mr. F. T. Vallins, this subspecies is intermediate in several characters between *disparatus disparatus* and *pseudoletha*, being almost the same size as the latter (19 mm.) but having the black borders nearly as broad as the former (F 1 mm.,

H 2 mm.). The markings on the Un resemble those of *pseudoletha*. The genitalia differ slightly from the Assam specimen having the tegumen a little broader laterally and the saccus a little longer.

The Up reflects yellowish-bronze when wet.

HOLOTYPE MALE. Sikkim, June (ex Antram coll.), B.M. 1956–34, B.M. Type No. Rh. 16052, Gen. No. T.G.H. 1955–175, in B.M. (N.H.).

DISTRIBUTION. Sikkim.

Neozephyrus rarasanus Matsumura

(Fig. 45*a*)

Zephyrus rarasanus Matsumura, 1939, *Insecta matsum.* **13** : 110.

Holotype male in coll. S. Hirayama.

Through the kindness of Dr. T. Shirôzu of Kyushu University it has been possible to examine a male of this very rare species. The specimen examined was taken on the same day—20.vi.1938 on Mt. Rara—as the type.

In general appearance it resembles *pseudotaiwanus* but has slightly broader borders to the wings (F ·75 mm., H 1·75 mm.), that on F widening a little at apex. The Un is very similar except for the discocellular bars which are a little more distinct. The drawing of the valva in *Trans. Kansai ent. Soc.* 1943, **13** (1), 54 is slightly twisted from the ventral view towards the lateral and consequently does not show the apical hook which places this species next to *disparatus*, that in *rarasanus* being not quite so well developed but sharply cut off at the tip. The falces are very similar in shape, as is the aedeagus, which is much slimmer than that of *pseudotaiwanus*.

Apart from the original figure of the male there is a half tone of both sexes in *Zephyrus* 1941, **9** : 7 and 8, figs. 2 and 6.

The male Up reflects violet when wet. The female apparently belongs to the A form.

DISTRIBUTION. Formosa (Mt. Rara).

GROUP 2

Neozephyrus mushaellus Matsumura

(Fig. 28)

Zephyrus mushaellus Matsumura, 1938, *Insecta matsum.* **13** : 44.
Zephyrus taiwanus Wileman, 1909, *Annot. zool. japan* **7** : 89 (*partim*, ♂).
Zephyrus coruscans ssp. *takasagoensis* Nire, 1920, *Zool. Mag. Tokyo* **32** : 374 (*partim*, ♀).
Zephyrus taiheizana Nomura, 1931, *Zephyrus* **3** : 59, figs. 2*b*, *c*, 4*c*.

Wileman, when he described *taiwanus*, took a female as his holotype since at the time of description he had only this one sex before him (1908, *Annot. zool. japan* **6** : 324). The following year he described what he thought to be the male but which actually has proved to be *mushaellus*. It would not be out of place to mention here that the holotype female of *taiwanus* on examination has proved to be exactly the same as *takasagoensis* so that the latter name will have to sink as a synonym. Further-

more the figure of the allotype female of *takasagoensis* in *Trans. Kansai ent. Soc.* **13** (1), pl. 5 (?) lower fig. 2 agrees with and must belong to *mushaellus*.

The differences between the male of this species and that of *pseudotaiwanus* have already been mentioned under the latter name and the female according to Sibatani & Murayama (as *takasagoensis*) may belong to either form B or AB. The male is figured as *taiwanus* in *Zephyrus* 1941, **9** : pls. 7 and 8, fig. 5. The Up reflects greenish gold when wet.

Esaki (1937, *Zephyrus* **7** : 95) states that *taiheizana* is a synonym of *takasagoensis* ; apparently the name was based on two specimens, the " ♂ " being a ♀ of *taiwanus* (*takasagoensis*) and the ♀ being a ♀ of *mushaellus*.

DISTRIBUTION. Formosa.

ssp. ***rileyi*** Forster

(Fig. 27)

Zephyrus rileyi Forster, 1940, *Mitt. münch. ent. Ges.* **30** : 871, pls. 22–23, figs. 1 and 2.

Holotype male and allotype female and two paratype females in Zoological Museum, Berlin from Kwangtung Province, China.

Through the kindness of Dr. R. Mell and Dr. E. M. Hering the author has been able to examine the type series. The male genitalia have been examined and there is no doubt that this constitutes the Chinese race of *mushaellus* (Sibatani, 1946, *Bull. lep. Soc. Japan* **1** (3) : 86).

The male may be distinguished by the deep bluish-green of the gr. c. which turns to a greenish-gold when wet, very similar in tint to *niitakanus* when dry and the narrow and broken postdiscal line of the UnF which becomes obsolescent towards the costa. The length is 23·5 mm.

The female varies from form A to AB or B and may be distinguished by the same difference in the postdiscal line of the UnF as the male. It measures 22·5 mm. in length. The Höne collection has two females, one from Linping, Kwangtung (AB), the other from West Tien-Mu-Shan (1,600 m.) Chekiang Prov. (B). The B.M. (N.H.) also has two females, one from Kwanhsien, W. China the other from Siao-lou, Szechwan both belonging to the B form. The former has a small buff spot in sp. 2 towards the margin of the UpH similar to some specimens of *smaragdinus*.

DISTRIBUTION. China.

Neozephyrus hisamatsusanus Nagami & Ishiga

(Fig. 29)

Zephyrus hisamatsusanus Nagami & Ishiga, 1935, *Fukuoka Hakubutsugaku Zasshi*. **1** : 303.

This species is well figured in *Zephyrus* 1937, **7** (2) : pl. 9, figs. 4–5. It may be separated at once by the broad white postdiscal line of the UnH being in the form of a " V " not a " W " as is usual. The B.M.(N.H.) has only one male labelled Kitayama, Sugitoge Pass, Kyoto, 11.vii.1947. It measures 19·5 mm. and reflects violet when wet on Up. The female belongs to the AB form.

DISTRIBUTION. Japan.

Neozephyrus suroia Tytler *comb. nov.*

(Fig. 30)

Zephyrus suroia Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 125, pl. 4, figs. 30, 31.

Holotype male and allotype female in B.M. (N.H.).

A very distinct species and the only representative of the *taxila-coruscans* group occurring within the Indian region (*sensu lato*), having pale markings in the discal area of both UnF and UnH. The cell bars, as is usual in this group, are not darkened, but the whitish lines inward of these are greatly widened and in the H the sub-basal bar in sp. 7 extends as far as the base of v. 2 on the cubitus or median vein of cell. All the white lines on the Un are broad and have a bluish tint and contrast sharply with the buffy-brown gr. c. The UpH of the male has the blue marginal line widened and a patch of the same colour basad in sp. 7. The female belongs to the B form though in one specimen in the B.M. (N.H.) there is a very indistinct reddish-brown smear in the middle of sp. 3.

The male Up reflects brilliant violet when wet.

DISTRIBUTION. Only recorded from Mt. Suroifui in E. Manipur at 8,000–9,000 ft.

Neozephyrus dubernardi Riley *comb. nov.*

(Figs. 31, 90, 99)

Thecla coruscans ssp. *dubernardi* Riley, 1939, *Novit. zool.* **41** : 356.

Holotype male in B.M. (N.H.), B.M. Type No. Rh. 16055, Gen. No. T.G.H. 1955–122.

An examination of the genitalia has proved this to be a genuine species. It may be separated from *coruscans* by the narrow and more irregular markings on the Un, the postdiscal line of the F closely resembling that of *suroia*, and the rather brownish white fringes. The length is 21 mm.

The Up reflects violet when wet.

DISTRIBUTION. Only the holotype is known, from Tsekou, Yunnan.

Neozephyrus coruscans Leech

(Fig. 32)

Zephyrus coruscans Leech, 1893, *Butterflies of China, Japan and Corea* **2** : 373, pl. 27, figs. 7 and 8.

Type male and allotype female in B.M. (N.H.) from Ni-tou, W. China.

Apart from Leech's excellent figures this well-known W. Chinese species is figured by Seitz (*Macrolep. World* **1** : 73). Its size, several of the males in the B.M. (N.H.) being 24 mm. in length, the broad black margins to the male Up, the pure white postdiscal lines, and the large apricot-orange ocellus and tornal patch on the Un separate this species from any previously described.

The female belongs to the B form and the male Up reflects violet when wet.

DISTRIBUTION. W. China, Siao-lou, Moupin, Ta-tsien-lou, Tay-Tou-Ho, Omei shan and Ni-tou.

Neozephyrus helenae sp. n.

(Figs. 33, 88, 89, 97, 98)

On examination, the genitalia of the specimens under the preceding species in the B.M. (N.H.) were found to comprise two forms, and on sorting the specimens concerned into their respective forms it was obvious that there was another species involved as well as *coruscans*, with *helenae* the commoner of the two. Compared with *coruscans* this species may be separated by the following characters:

Male UpF. The gr. c. is bluer-green ; the black border is narrower in sp. 2 being 1·5 mm. compared with 2 mm. in *coruscans* giving the wing the appearance of having a wider black apex. The gr. c. reflects violet when wet.

Male UpH. The blue marginal line on either side of v. 2 at base of tail is distinct whereas in *coruscans* it is often absent or reduced to a few scales at v. 2.

FEMALE. Belongs to B form ; only separable by the blue marginal line on UpH being as in the male, for the Un in both sexes are as in *coruscans*.

HOLOTYPE MALE. Siao-lou, 1900, Chasseurs indigènes, ex Oberthür coll. 1927–3, B.M. Type No. Rh. 16056, in B.M. (N.H.).

ALLOTYPE FEMALE. Same data as holotype. B.M. Type No. Rh. 16057, in B.M. (N.H.).

PARATYPES. Forty-four males and 45 females from Siao-lou, Ta-tsien-lou, Moupin, Tien-tsuen, Si-Pin-Lou-Chan, Kwanshien, Ni-tou, W. China, in B.M. (N.H.).

DISTRIBUTION. W. China.

There are several female specimens in the series in the B.M. (N.H.) that have scattered purple-violet scales in sp. 1*a* of UpF. In two or three specimens these are extended into the basal area of sp. 1 forming a diffuse patch of this colour. For this, the AB form, I propose the name : ***violescens*** ♀ forma n.

HOLOTYPE FEMALE. Siao-lou, 1900, Chasseurs indigènes, ex Oberthür coll. B.M. 1927–3, B.M. Type No. Rh. 16058, in B.M. (N.H.).

Neozephyrus taiwanus Wileman

(Figs. 34, 91, 100)

Zephyrus taiwanus Wileman, 1908, *Annot. zool. japan* **6** : 324 (♀).
Zephyrus coruscans takasagoensis Nire, 1920, *Zool. Mag. Tokyo* **32** : 324.

Holotype female and allotype male in B.M. (N.H.).

As already mentioned under the name *mushaellus*, when Wileman described *taiwanus* he had only the female before him (1908) ; a year later he described a male which he thought to be this species but which actually belongs to Matsumura's species and until the present examination of the types concerned was carried out much confusion has existed in the synonymy of the various species inhabiting Formosa.

Both sexes of this species are well figured in *Zephyrus*, 1937, **7** : pl. 9, figs. 1 and 2 under the name *takasagoensis*, the female belonging to the A form. Apparently there is an AB form of the female which was named *tattakana* Matsumura (1929, *Insecta matsum.* **3** : 101), but since the type of *taiwanus* belongs to this form the former name will have to be sunk.

This species may be distinguished in the male by the broad black apical area to UpF and by the UnH having the white postdiscal " W " running straight from the middle of sp. 2 to costa half-way between sub-basal bar and submarginal band, the latter being bluish. The female is separated by the same UnH characters as the male.

The male Up reflects violet when wet.

DISTRIBUTION. Formosa.

Neozephyrus taxila Bremer

(Fig. 35)

Thecla taxila Bremer, 1861, *Bull. Acad. Sci. St-Pétersb.* **3** (7) : 470.

In the past this species was divided into several subspecies :

taxila Bremer (*ibid.*) from Manchuria, Hokkaido, and according to Riley (1939, *Novit. Zool.* **41** : 356) also from the higher elevations of Honshu.

regina Butler, 1881, *Proc. zool. Soc. Lond.* 853 from Toshima and Iburi, Hokkaido.

sachalinensis Matsumura, 1925, *J. Coll. Agric. Sapporo* **15** : 103 from Sakhalin.

japonica Murray, 1875, *Ent. mon. Mag.* **11** : 169 from S. Japan and Formosa. Type in B.M. (N.H.).

monticola Shirôzu, 1952, *Sieboldia* **1** (1) : 22, pl. 7, figs. 36, 40 from the montane regions of Honshu.

koreana Riley, 1939, *Nov. zool.* **41** : 356 from Korea. Type in B.M. (N.H.).

The Japanese workers on this genus were correct when they synonymized *regina* and *sachalinensis* with *taxila taxila*, and *monticola* and *koreana* with *japonica* as according to them and after examination of the material in this museum these do not appear to be separable either on external facies or genitalia. Consequently it would seem that, excluding the elevation factor, *taxila taxila* is to be found to the north of latitude 42° and *taxila japonica* to the south of this line both on the mainland of Asia and in the Japanese islands southward to Formosa. As would be expected the northern race is smaller (18 mm.) with paler gr. c. and narrower markings on Un while *japonica* is larger (20 mm.) and more boldly marked and has a browner gr. c. on Un. In the two subspecies various forms of the female, which intergrade one with the other, have been named and they are given below with their appropriate form letter(s) :

taxila taxila Bremer (= syn. *unicolor* Rühl 1892, *Pal. Grossschmett.* **1** : 188)	Form O
,, ,, *maculata* Rühl (*ibid.*)	B
,, ,, *regina* Butler (1881) (= syn. *bellus* Rühl. (*ibid.*)) . . .	AB
,, ,, *quercus* Rühl (= syn. *smaragdinoides* Staudinger (?)) . .	A
,, *japonica* Murray (1875).	O
,, ,, *pryeri* Esaki, 1935, *Erkl. Pryer Rhop. Nihon.* 10 . . .	AB
,, ,, *fasciata* Janson, 1878, *Cist. Ent.* **2** : 272	A
,, ,, *leechi* Esaki, 1938, *Zephyrus* **7** : 229	B

There is an aberration *sidemina* Kardakoff (1928, *Ent. Mitt.* **17** : 271) (= syn. *harukii* Hori & Tamanuki, 1937, *Karahuto Tyuo Sikensyo Hokoku Konuma* **19** : 177) which has the white postdiscal lines of the Un of both wings broadened outwardly as far as the submarginal areas forming a white band on each wing. This aberration was originally described from a male from Amur and is figured in Seitz (*Macrolep. World* **1** : *Suppl.* pl. 15*b*) and the B.M. (N.H.) has a female not quite so extreme from Manchuria and a male from Hokkaido so that it is recurrent and occurs in both sexes.

The male Up reflects a very brilliant violet when wet.

DISTRIBUTION. Manchuria, Amurland, Korea, Japan and Formosa.

GROUP 3

This " group " consists of nine species confined to the Indian side of the Himalayas and the bordering countries. They form a compact group characterized by the males having the Up gr. c. a paler green sometimes shot with violet with the black borders either the same width in both F and H or broader in the F. The females have the orange-brown patch of the AB form replaced with white and the blue much more extensive, often covering the disc of the H from the submarginals of the anal area to v. 6 and of a much more blue-violet tint. The Un gr. c. of both sexes is usually a silvery-grey with the discoidal bars distinct. In size they are generally smaller than the other representatives of *Neozephyrus*, the largest specimen of *syla* being 20 mm., the more normal being approximately 18 mm. Genitalically the males exhibit a type of variation very similar to that of the previous sections of the genus.

Neozephyrus birupa Moore *comb. nov.*

(Figs. 36)

Dipsas birupa Moore, 1877, *Ann. Mag. nat. Hist.* **20** : 51.

Types in B.M. (N.H.).

Specimens in B.M. (N.H.) from Simla, Mussoorie, Raniket and Kumaon; also a male labelled " Sikkim ", and another pair from " Silhet " (Sylhet, Assam) which may be incorrectly labelled as Evans gives the distribution as Simla to Kumaon. Also in the collection are specimens from Nepal (F. M. Bailey) where it is widely distributed from Chandragiri, Sissagarhi, Katmandu and Nargarkot; these have the Un more silvery than those from other areas.

The male Up reflects violet when wet.

Neozephyrus bhutanensis sp. n.

(Figs. 37, 96, 105)

The male UpF very similar to *birupa* but with the border (2 mm.) broader than that of H (1·5 mm.); length 18 mm.; fringe white from tornus to v. 2 then brown to apex. On the UpH the fringe is white and the tail is as in *birupa* (2·5 mm.). On the Un it is very similar to *triloka* but with the markings slightly broader, and the black ocellus and tornal spot of H are more prominent. The Up reflects violet when wet.

HOLOTYPE MALE. N. India, Bhutan, Trongsa, 6,500 ft., 7.vii.1933, F. Ludlow & G. Sheriff, B.M. 1933–634, B.M. Type No. Rh. 16059, Gen. No T.G.H. 1954–100, in B.M. (N.H.).

PARATYPE MALE. Dhimsa, Nepal, 22.x.1935, B.M. 1956–335, B.M. Type No. Rh. 16060, in B.M. (N.H.).

DISTRIBUTION. Bhutan and Nepal.

Neozephyrus triloka Hannyngton *comb. nov.*

(Figs. 38, 94, 95, 103, 104)

Zephyrus triloka Hannyngton, 1910, *J. Bombay nat. Hist. Soc.* **20** (2) : 367.

Holotype female and neallotype male in B.M. (N.H.).

Swinhoe in 1911 in Moore's *Lepidoptera Indica* **8**, p. 269 treated this species—the name wrongly spelt as *Ruralis trilocha*—as being only a dry form of the female of *syla* and subsequent authors have followed Swinhoe. Fortunately the late Lord Rothschild acquired Hannyngton's collection for the Tring Museum and when the author came to examine and amalgamate the material it was found that Hannyngton was quite correct when he described *triloka* as a distinct species. W. H. Evans has published a note about this in the *J. Bombay nat. Hist. Soc.* 1955, **53** (1) : 144.

Since the male has not been described a brief description is given below :

UpF. Gr. c. the typical powdery green ; black border narrow (1–1·25 mm.) ; fringe whitish ; length 17 mm.; reflects violet when wet.

UpH. Gr. c., border and fringe as F ; tail black tipped white (2·5 mm.).

UnF and UnH. Very similar to *bhutanensis* but with narrower dark markings and the black ocellus in sp. 2 of H much reduced and with no orange in sp. 2 or tornus.

NEALLOTYPE MALE. Kumaon, August, coll. Hannyngton, Rothschild Bequest, B.M. 1939–1, B.M. Type No. Rh. 16061, Gen. No. T.G.H. 1954–99, in B.M. (N.H.).

DISTRIBUTION. Only recorded from the Kumaon District, U.P., India. Apart from the types the B.M. (N.H.) possesses two females and a male, the latter from the Champion collection.

Neozephyrus jakamensis Tytler *comb. nov.*

(Fig. 39)

Zephyrus jakamensis Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 130, pl. 4, figs. 32, 33.

Holotype male and allotype female in B.M. (N.H.).

Apparently a local species inhabiting the Naga Hills, Manipur. Only Tytler's small series of males and the allotype female known.

The male Up reflects reddish-bronze when wet.

DISTRIBUTION. Manipur.

Neozephyrus syla Kollar *comb. nov.*

(Fig. 40)

Thecla syla Kollar, 1848, *Hügel, Kaschmir* **4** (2) : 414, pl. 4, figs. 7, 8.

This species is widely distributed and not rare in India and has much the same

distribution as *birupa*, except that it extends westward into Afghanistan. The B.M. (N.H.) has a male labelled " Sikkim " which may be incorrectly labelled as Evans only records it from Safed Koh and Chitral to Kumaon.

The male Up reflects violet when wet.

DISTRIBUTION. Afghanistan to Kumaon.

Neozephyrus assamicus Tytler *comb. nov.*

(Fig. 41)

Zephyrus assamica Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 130.

Holotype male and allotype female in B.M. (N.H.).

This species was considered to be a subspecies of *syla* by Evans (*Identification of Indian Butterflies*) and superficially the two species are rather similar but the genitalia are very different in several respects. However, there is no doubt that they are closely related, for both have the exceptionally long aedeagus, but the saccus in this species is only about half the length of that of *syla*.

The male Up reflects violet when wet.

DISTRIBUTION. Specimens in B.M. (N.H.) from Sikkim, Darjeeling, Assam, Manipur and Bhutan, and there is a female from Nepal in the F. M. Bailey coll.

Neozephyrus kirbariensis Tytler *comb. nov.*

(Fig. 42)

Zephyrus kirbariensis Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 130, pl. 4, figs. 36, 37.

Holotype male and allotype female in B.M. (N.H.).

The male reflects reddish-bronze on the Up when wet.

DISTRIBUTION. Specimens in B.M. (N.H.) from the same areas as *assamicus* namely Phesima, Kirbari, Jakama in the Naga Hills and Kabru in Manipur, but not from Sikkim.

Neozephyrus paona Tytler *comb. nov.*

(Fig. 43)

Zephyrus paona Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 131, pl. 4, figs. 34, 35.

Holotype male and allotype female in B.M. (N.H.).

The male Up reflects violet when wet.

DISTRIBUTION. Only the types known, the male from Mt. Kabru, the female from Paona Peak, Manipur.

Neozephyrus khasia de Nicéville *comb. nov.*

(Fig. 44)

Zephyrus khasia de Nicéville, 1890, *Butterflies of India* **3** : 301.
Zephyrus khasia de Nicéville, 1890, *J. Bombay nat. Hist. Soc.* **5** : 210, pl. E, fig. 4.
Zephyrus khasia de Nicéville, Tytler in 1915, *J. Bombay nat. Hist. Soc.* **24** : 131, pl. 4, fig. 44.

Holotype male and neallotype female (Tytler) in B.M. (N.H.).

Originally described by de Nicéville from a male from the Khasia Hills in the collection of the Rev. W. A. Hamilton. Swinhoe states that the type is in Calcutta

but this was probably an assumption on his part as there is a male labelled " Khasia Hills, *Zephyrus khasia* de Nicéville ♂ type, ex coll. Elwes 1902–85 " in the B.M. (N.H.).

Tytler took a series of both sexes in the Naga Hills at Phesima, Kirbari and Jakama and at Suroifui in Manipur. His neallotype is from Jakama.

The male Up reflects violet to violet-bronze when wet.

DISTRIBUTION. Assam and Manipur.

GROUP 4

Neozephyrus ataxus Doubleday & Hewitson

(Fig. 45)

Dipsas ataxus Doubleday & Hewitson, 1852, *Gen. Diurn. Lep.* **2** : 480, pl. 74, fig. 7.
Dipsas katura Hewitson, 1865, *Ill. Diurn. Lep.* **1** (4) : 65, pl. 26, fig. 12 (♀).

Types in B.M. (N.H.).

This large and very distinct species is separated from others of this genus by the male having a plain silvery white gr. c. to the Un with only the brown discoidal bars and submarginal marks of both F and H contrasting sharply with it. The female on the Un differs considerably from the male in being predominantly brown with silvery fasciae between the postdiscal and submarginal bands of the F, and the H having a broad silvery median fascia.

The nominotypical race occurs in the Punjab, Murree Hills etc., the United Provinces, Mussoorie and Kumaon districts and Upper Burma and is distinguished by the male having the black border of the UpF broadening conspicuously towards the apex. The female belongs to the AB form.

The male Up reflects violet-bronze to reddish-bronze when wet.

DISTRIBUTION. Punjab to Upper Burma.

ssp. ***zulla*** Tytler

Zephyrus ataxus zulla Tytler, 1915, *J. Bombay nat. Hist. Soc.* **24** : 124.

Types in B.M. (N.H.).

Tytler described this subspecies from the Naga Hills. It has the black border of the male UpF much narrower and not widening at apex. Specimens from Szechwan, W. China are similar. It has been well figured in Seitz (*Macrolep. World* **1** : 271, pl. 74*a*) and by Leech in *Butterflies of China, Japan and Corea* **2** : 374, pl. 27, figs. 5, 6.

The female belongs to the AB form.

DISTRIBUTION. Naga Hills, Assam and W. China.

ssp. ***kirishimaensis*** Okajima

Zephyrus ataxus var. *kirishimaensis* Okajima, 1922, *Zool. Mag. Tokyo* **34** : 586.

This subspecies from Honshu, Shikoku and Kyushu in Japan differs a little from *zulla* in having the Un of the male more sparsely marked with brown, the discoidal bars in the one specimen in the B.M. (N.H.). being obsolete. The female belongs to

the A form but the purple-blue is not so extensive as that in the mainland forms and does not reach the base of the F. According to Murayama & Sibatani it also has a female of the AB form.

DISTRIBUTION. Japan.

ssp. ***yakushimaensis*** Yazaki, 1924, *Zool. Mag.* **35** : 391, 417 (not seen)

Apparently a rather rare and local subspecies from Yakushima Is. near the southern tip of Kyushu, which seems only to differ from *kirishimaensis* in having the tails of the H much reduced or absent.

DISTRIBUTION. Yakushima Is., Japan.

GROUP 5

Genus ***AUSTROZEPHYRUS*** gen. nov.

Type of genus : *Dipsas absolon* Hewitson (1865).

The male genitalia are characterized by the complete lack of falces, the enormous development of the uncus, the well-developed tegumental ridge, the comparatively small valves and the aedeagus having the basal portion approximately a third of the total length. It may be mentioned here that only one other species of " *Zephyrus* " examined has the falces missing, this being *courvoisieri* Oberthür, which is placed temporarily in *Teratozephyrus*, the falces in that genus being simplified and very reduced. Externally the frons, eyes, palpi, antennae, legs and neuration are similar to those of *Neozephyrus*, but the males have the black apex of the UpF extending basad towards the cell and not including the costa, thus giving a notched appearance to the inner edge of the black apical marking. Both sexes have the Un suffused with purple and with the postdiscal line of UnH in the form of a " V ". The males as far as is known all reflect yellow gold on Up when wet.

The generic name was suggested by the distribution of the species, which are the most southerly representatives of " *Zephyrus* ", inhabiting Malaya, Java, Sumatra and Borneo, and thus actually extending into the southern hemisphere.

Austrozephyrus absolon Hewitson ***comb. nov.***

(Fig. 46)

Dipsas absolon Hewitson, 1865, *Illustrations Diurnal Lepidoptera* **1** (4) : 65, pl. 30, figs. 11, 12, ♂.
Zephyrus absolon Hewitson (de Nicéville) 1895, *J. Bombay nat. Hist. Soc.* **9** : 291–3.

Holotype male in B.M. (N.H.).

There are two distinct forms of this butterfly, the first with a violet-brown postdiscal area on the Un of both F and H (form 1), the other with a well-developed white postdiscal band (form 2). There has been some confusion over these two forms in the past. Originally Hewitson described and figured this species from a male labelled " Indies or." belonging to form 1. In 1895 de Nicéville commented on the two forms and redescribed the male of form 1 from Mt. Gede, 4,000 ft., W. Java, adding a description of the female of form 2 from Sukabumi, 2,000 ft. W. Java.

Later on in the same paper he mentions that he has another female from the same locality as the male that belonged to the same form i.e. form 1. Seitz (*Macrolep. World* **9** : 968, pl. 155*a*) apparently took Fruhstorfer's specimen (form 2) from "Soekaboemi (Sukabumi) 2,000 ft." as being typical, disregarding Hewitson's figure and description and described it as being "recognizable by the broad white postdiscal band". Fruhstorfer's male specimen was labelled "Type" in his collection, now in the B.M. (N.H.), but had no name attached to it. Toxopeus (1935, *Ent. Med. Ned.-Indie.* **1** (2) : 33–36) summarizes the literature but confuses the issue still further by naming the female of form 1 *acosmeta*. Why de Nicéville wrongly associated the two forms will have to remain a mystery for there is no doubt the typical form (form 1) with no white postdiscal bands on Un must be that which agrees with Hewitson's holotype male. Therefore *acosmeta* is a synonym of the typical form and since it leaves the white banded form in both sexes (form 2) without a name, which it well deserves, I propose the name ***albifasciatus*** forma n. for it.

HOLOTYPE MALE. Java occident, Sukabumi, 2,000 ft., 1893, Fruhstorfer coll., B.M. 1933–131, B.M. Type No. Rh. 16064, in B.M. (N.H.).

ALLOTYPE FEMALE. Java. W. H. Evans coll. B.M. 1932–274, B.M. Type No. Rh. 16065, in B.M. (N.H.).

The series in the B.M. (N.H.) consists of three males and four females including Hewitson's type and the types of *albifasciatus*.

The male Up reflects a deep gold when wet.

DISTRIBUTION. Java.

ssp. ***thamar*** Toxopeus

Ruralis absolon thamar Toxopeus, 1935, *Ent. Med. Ned-Indie.* **1** (2) : 35.

This subspecies is the Sumatran race and may be separated from the typical *absolon* from Java by the UnF having the orange spot larger and extending upwards as far as the top of the cell bar, and by the female having the orange spots of the UnF more than twice as large as the Javan specimens.

The B.M. (N.H.) has one male from Mt. Kaba, 1,600 m. (Hagen).

DISTRIBUTION. Sumatra. Toxopeus records it from Mt. Tanggamoes, S. Sumatra, nearly 7,000 ft.

ssp. ***malayicus*** Pendlebury

(Fig. 92, 101)

Thecla malayica Pendlebury, 1939, *J.F.M.S. Mus.* **18** : 391.

Holotype female in B.M. (N.H.).

The male is unknown and until it has been examined the exact relationship of the Malayan specimens will have to remain in doubt. Pendlebury originally described it as a distinct species together with *borneanus* but Corbet (1941, *J.F.M.S. Mus.* **18** : 812) stated that almost certainly they were both subspecies of *absolon*. However on examination *borneanus* has proved to be a separate species so that when the male has been examined *malayicus* itself may be found to be a separate species or may

even be related to *borneanus*. Since however the Un more closely resembles that of *absolon* it seems as well to leave it as a subspecies of this in accordance with Corbet.

DISTRIBUTION. Malaya. The type comes from Pahang, Cameron Highlands.

Austrozephyrus borneanus Pendlebury *comb. nov.*

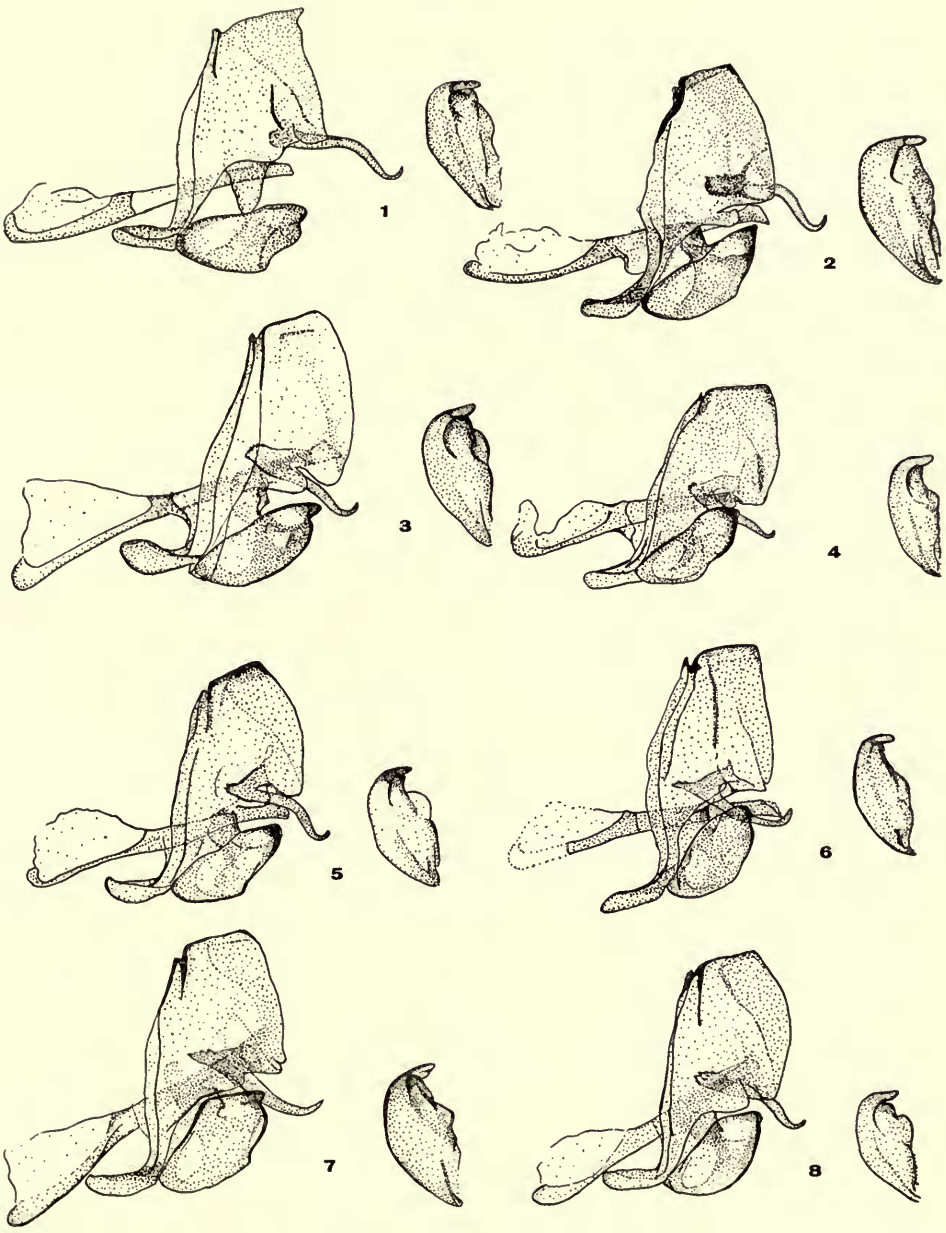
(Figs. 47, 93, 102)

Thecla borneana Pendlebury, 1939, *J.F.M.S. Mus.* **18** : 392.

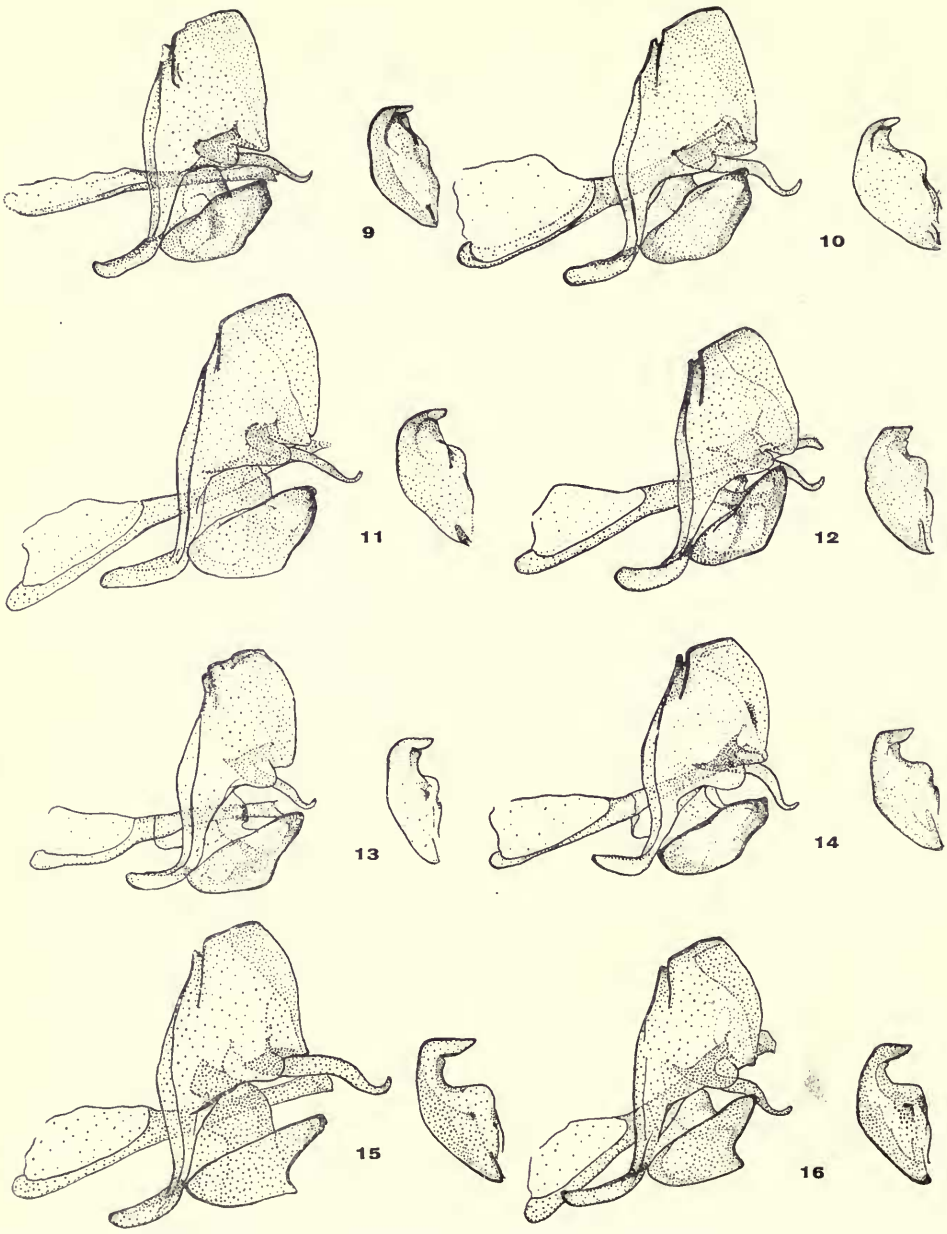
Only the unique male known. Described by Pendlebury as a distinct species, it was erroneously thought by Corbet to be the Bornean subspecies of *absolon*. The type male in B.M. (N.H.) is labelled " B.N. Borneo, Mt. Kinabalu, Marei Parei, 5,000 ft., 30.iv.1929, H. M. Pendlebury, B.M. 1940–158, B.M. Type No. Rh. 16066, Gen. No. T.G.H. 1955–133".

It reflects a deep gold on Up when wet.

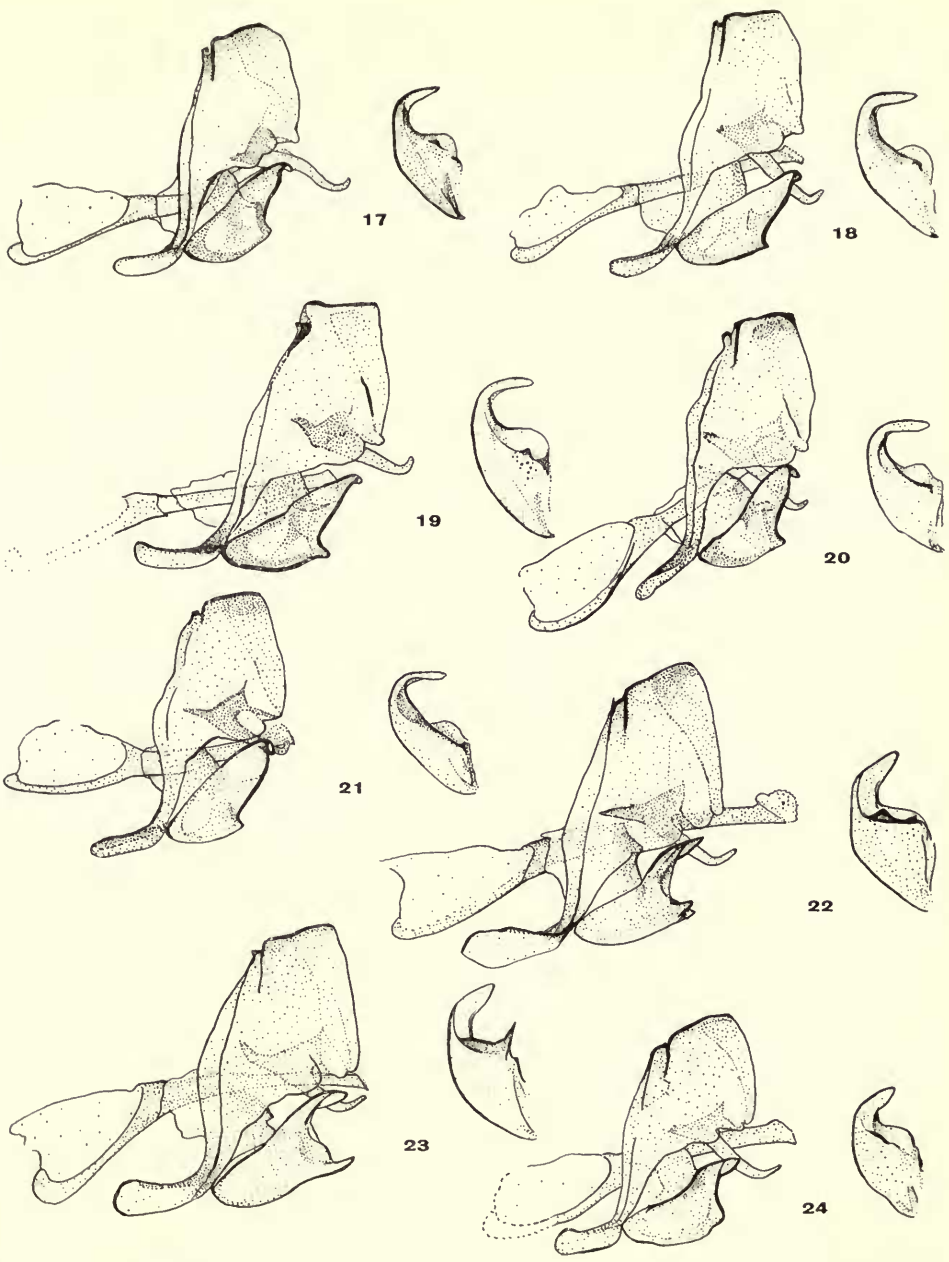
DISTRIBUTION. Borneo.



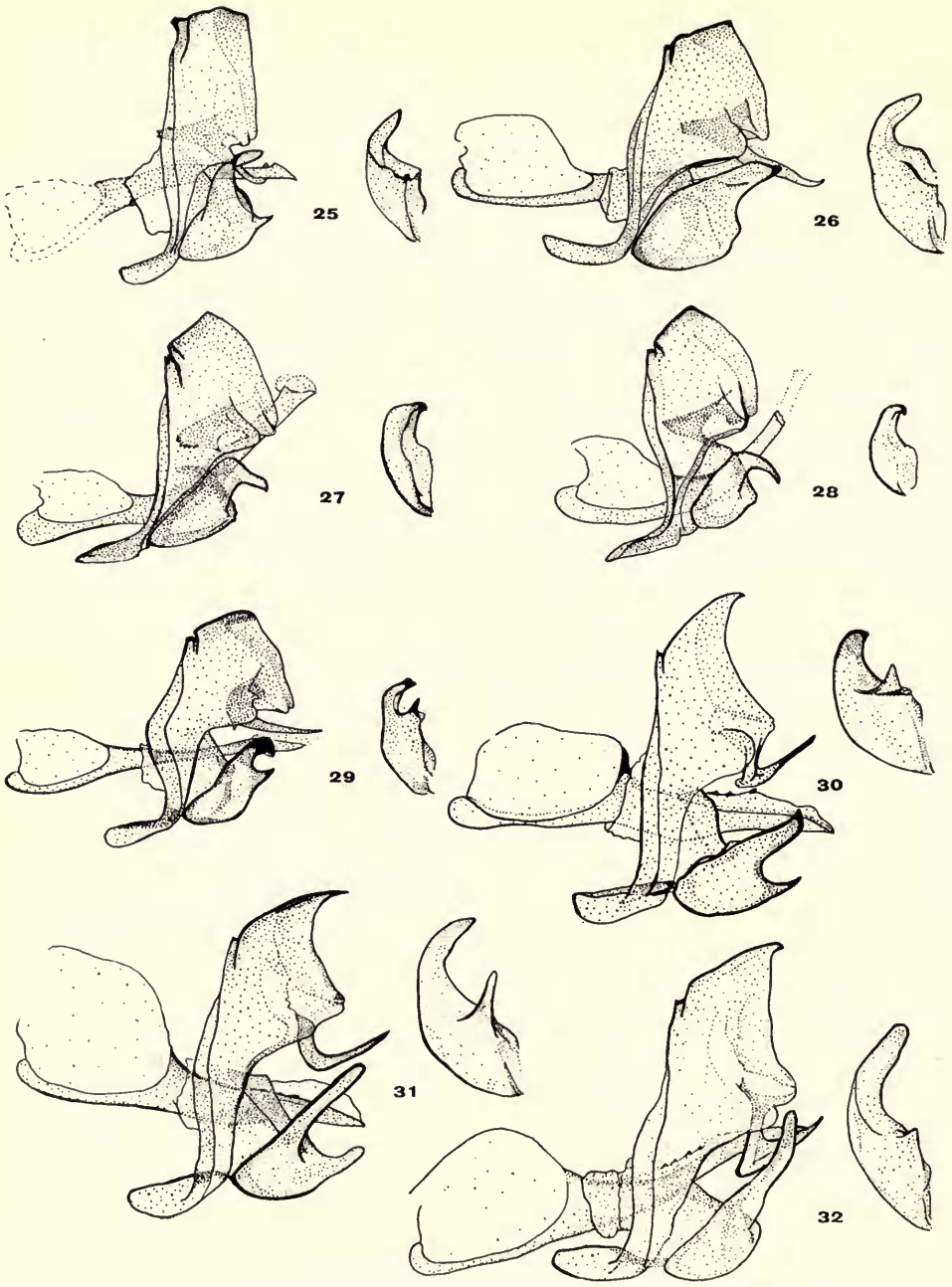
FIGS. 1–8. Male genitalia of *Neozephyrus* showing the lateral aspect and the ventral aspect of the right valva: (1) *aurorinus* Oberthür, (2) *sikkimensis* sp. n. (type), (3) *nigroapicalis* sp. n. (type), (4) *kabrua* Tytler, (5) *kabrua niitakanus* Kano, (6) *scintillans* Leech (type), (7) *watsoni* Evans (type), (8) *teisoi* Sonan.



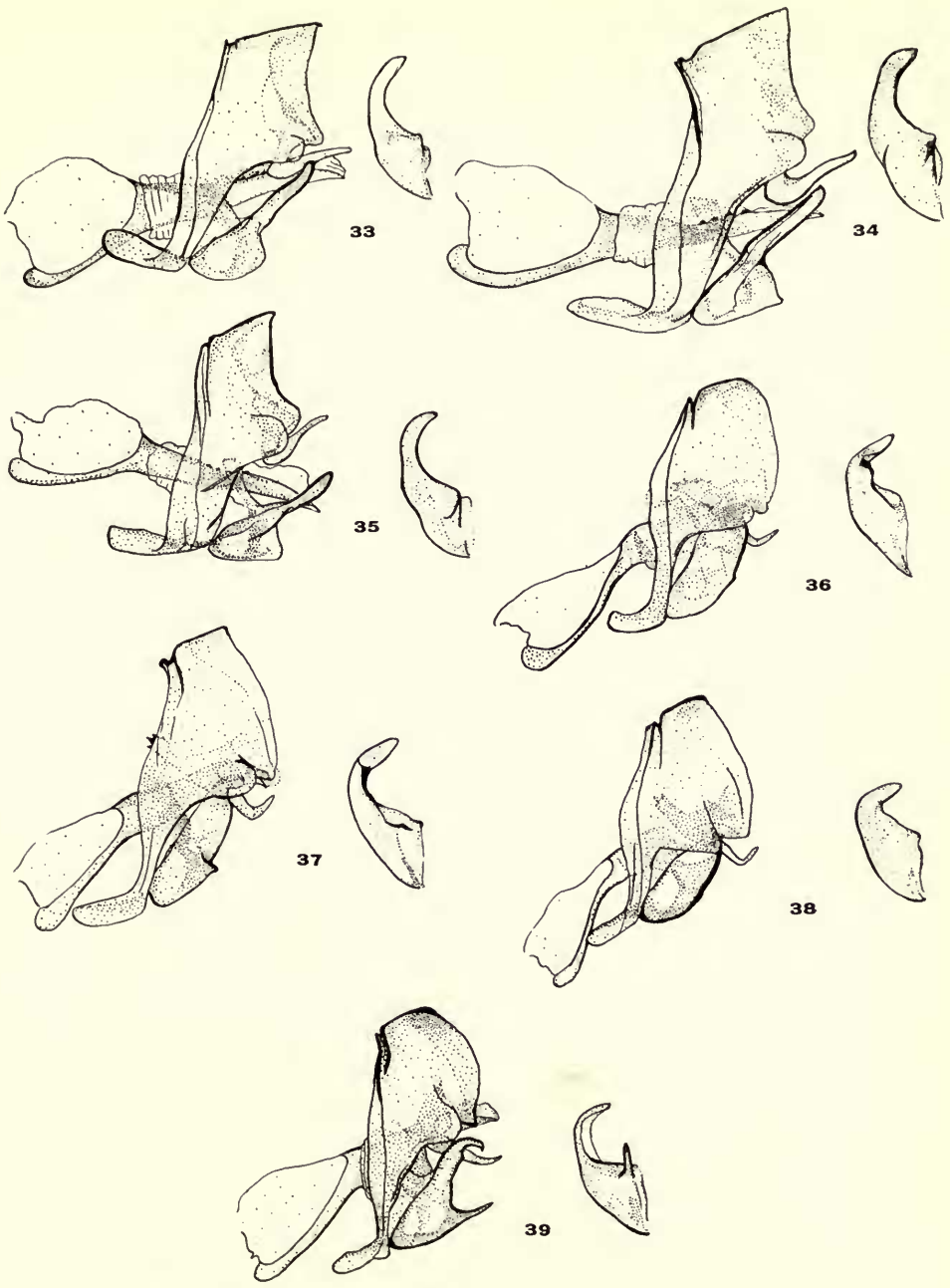
FIGS. 9–16. Male genitalia of *Neozephyrus* showing the lateral aspect and the ventral aspect of the right valva : (9) *vittatus* Tytler, (10) *marginatus* sp. n. (type), (11) *zoa* de Nicéville, (12) *tytleri* sp. n., (13) *sandersi* sp. n. (type, (14) *intermedius* Tytler, (15) *desgodinsi* Oberthür, (16) *desgodinsi dumoides* Tytler.



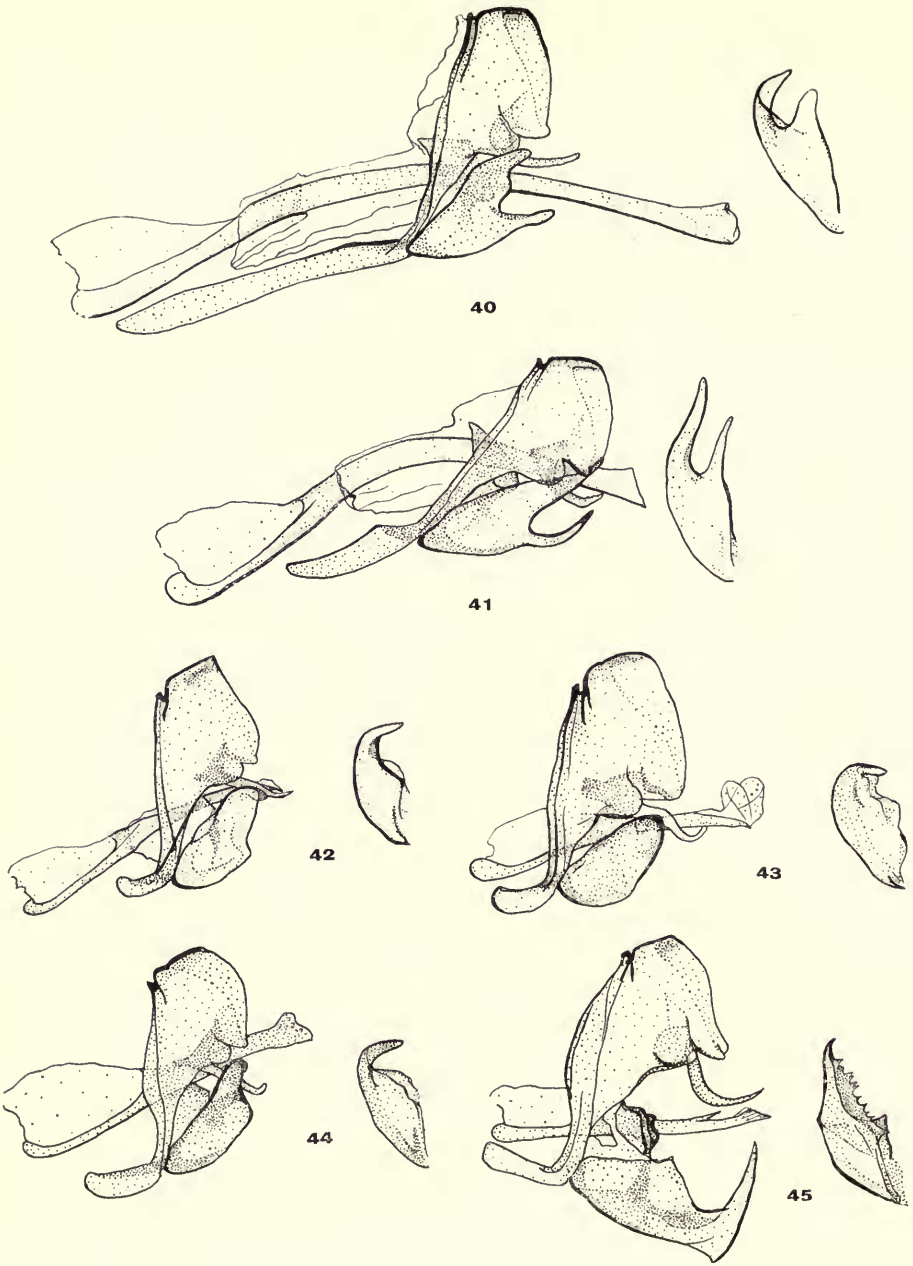
FIGS. 17–24. Male genitalia of *Neozephyrus* showing the lateral aspect and the ventral aspect of the right valva : (17) *duma* Hewitson, (18) *tatsienluensis* Murayama (type), (19) *yunnanensis* sp. n. (type), (20) *smaragdinus sikongensis* Murayama, (21) *smaragdinus* Oberthür, (22) *tienmushanus* Shirôzu & Yamamoto (23) *chinensis* sp.n. (type), (24) *souleana* Riley.



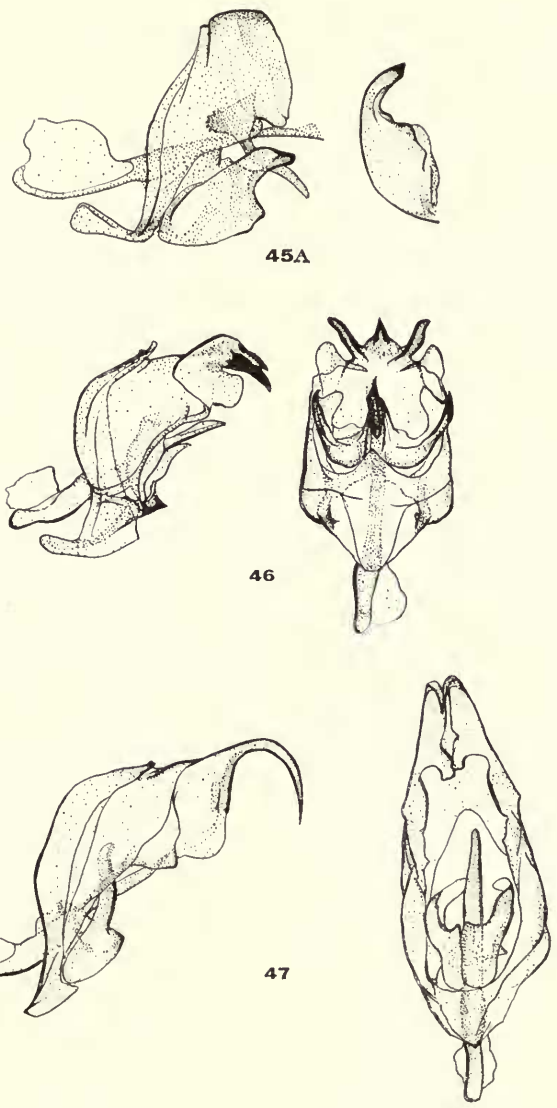
FIGS. 25–32. Male genitalia of *Neozephyrus* showing the lateral aspect and the ventral aspect of the right valva : (25) *souleana* ssp. ?, (26) *disparatus* sp. n., (27) *mushaellus rileyi* Forster (type), (28) *mushaellus* Matsumura, (29) *hisamatsusanus* Nagami & Ishiga, (30) *suroia* Tytler, (31) *dubernardi* Riley (type), (32) *coruscans* Leech.



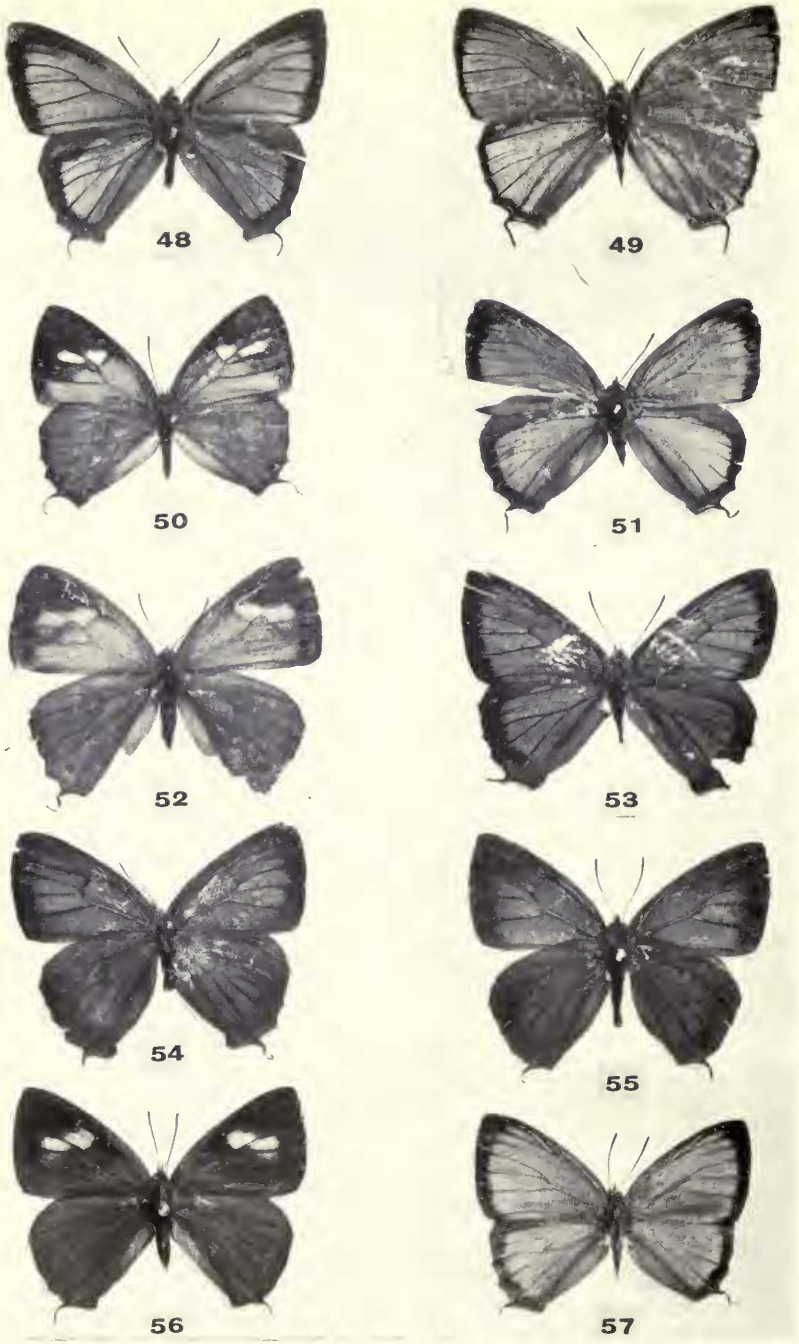
FIGS. 33–39. Male genitalia of *Neozephyrus* showing the lateral aspect and the ventral aspect of the right valva: (33) *helenae* sp. n., (34) *taiwanus* Wileman, (35) *taxila* Bremer, (36) *birupa* Moore, (37) *bhutanensis* sp. n. (type), (38) *triloka* Hannyngton (neallotype), (39) *jakamensis* Tytler.



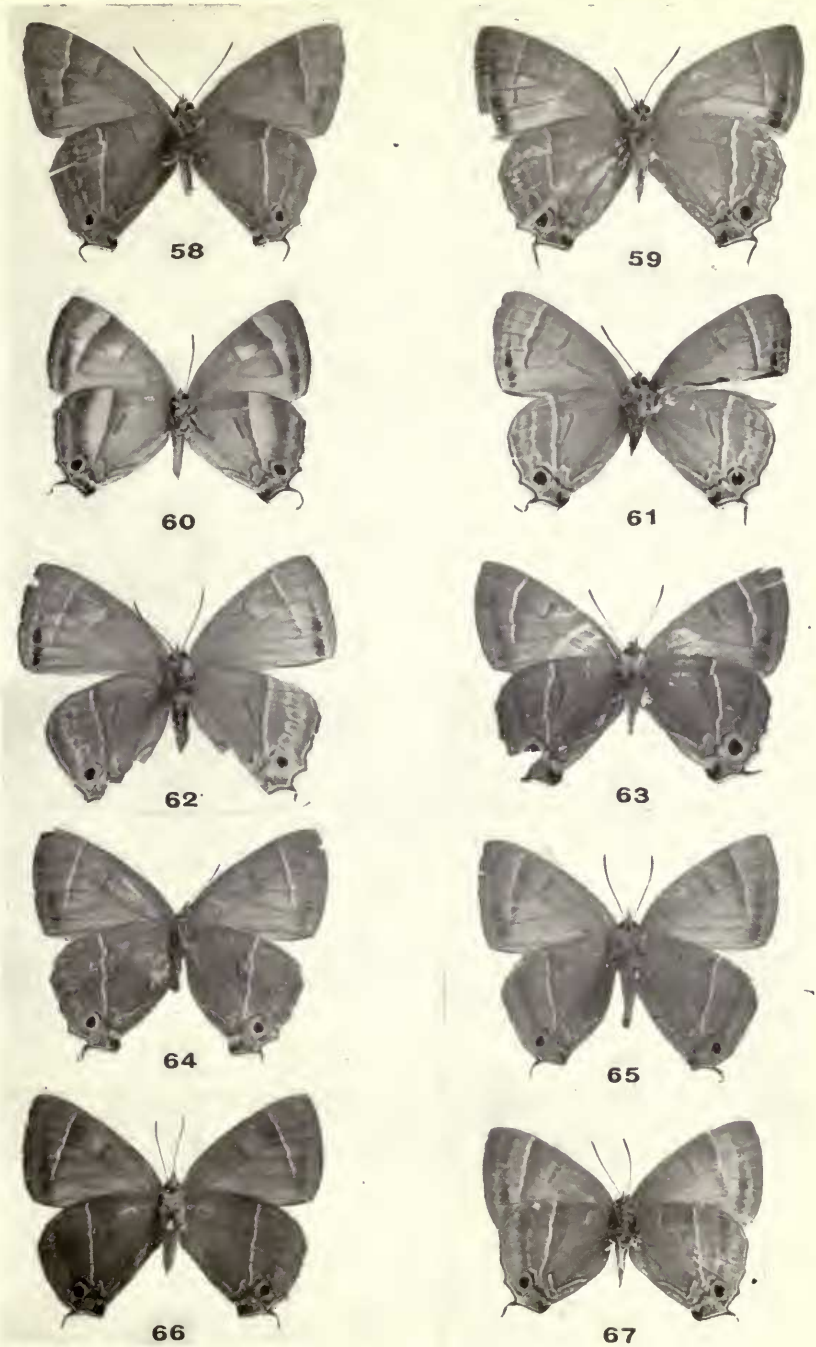
FIGS. 40–45. Male genitalia of *Neozephyrus* showing the lateral aspect and the ventral aspect of the right valva: (40) *syla* Kollar, (41) *assamicus* Tytler, (42) *kirbariensis* Tytler, (43) *paona* Tytler (type), (44) *khasia* de Nicéville, (45) *ataxus* Hewitson.



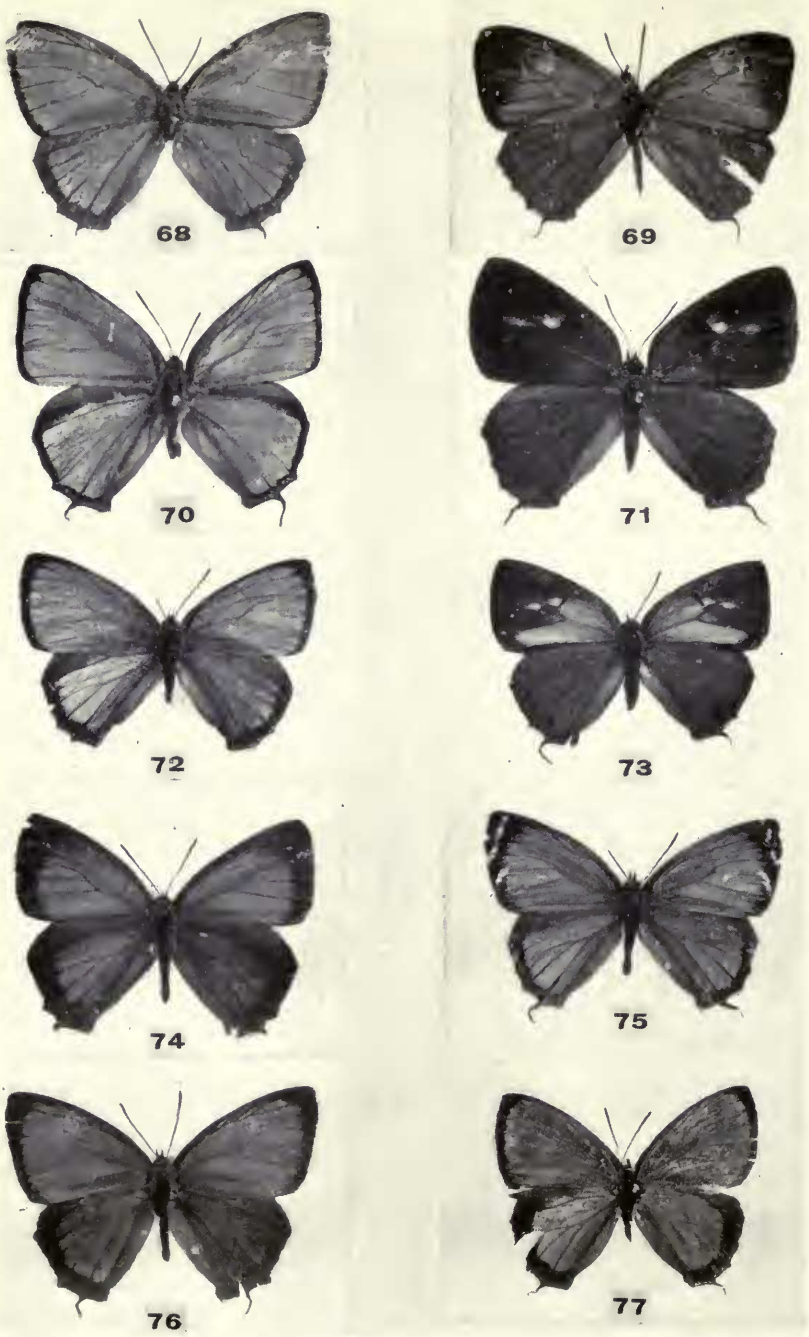
FIGS. 45*a*–47. (45*a*) Male genitalia of *Neozephyrus rarasanus* Matsumura showing the lateral aspect and the ventral aspect of the right valva. Male genitalia of *Austrozephyrus* gen. n. showing the lateral and ventral aspects. (46) *absolon* Hewitson, (47) *borneanus* Pendlebury (type).



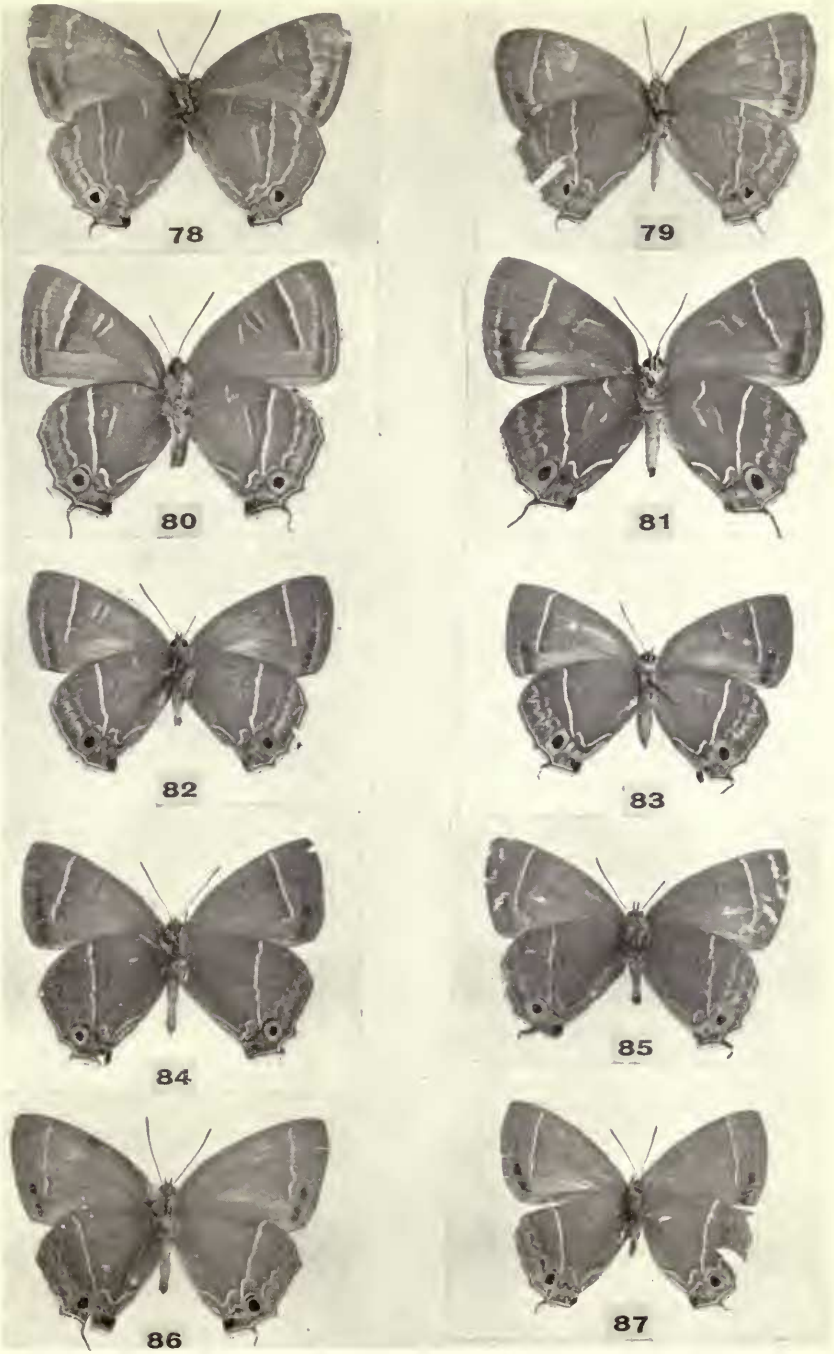
FIGS 48–57. Uppersides of *Neozephyrus*: (48) *sikkimensis* sp. n. holotype male, (49) *nigroapicalis* sp. n. holotype male, (50) *kabrua* Tytler neallotype female, (51) *watsoni* Evans holotype male, (52) *watsoni* Evans allotype female, (53) *marginatus* sp. n. holotype male, (54) *zoa* de Nicéville male, (55) *tytleri* sp. n. holotype male, (56) *tytleri* sp. n. allotype female, (57) *sandersi* sp. n. holotype male.



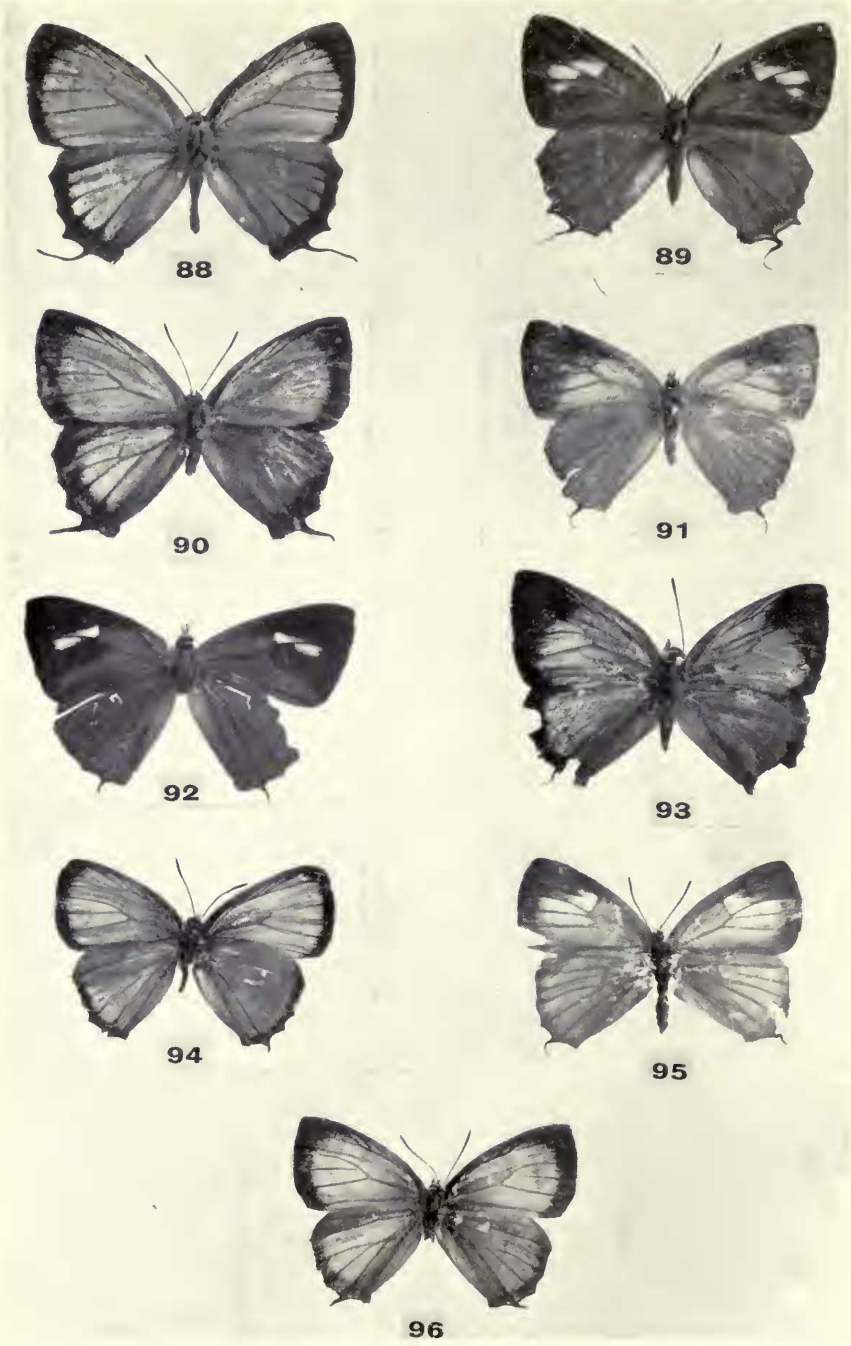
FIGS. 58–67. Undersides of *Neozephyrus*: (58) *sikkimensis* sp. n. holotype male, (59) *nigroapicalis* sp. n. holotype male, (60) *kabrua* Tytler neallotype female, (61) *watsoni* Evans holotype male, (62) *watsoni* Evans allotype female, (63) *marginatus* sp. n. holotype male, (64) *zoa* de Nicéville male (65) *tytleri* sp. n. holotype male, (66) *tytleri* sp. n. allotype female, (67) *sandersi* sp. n. holotype male.



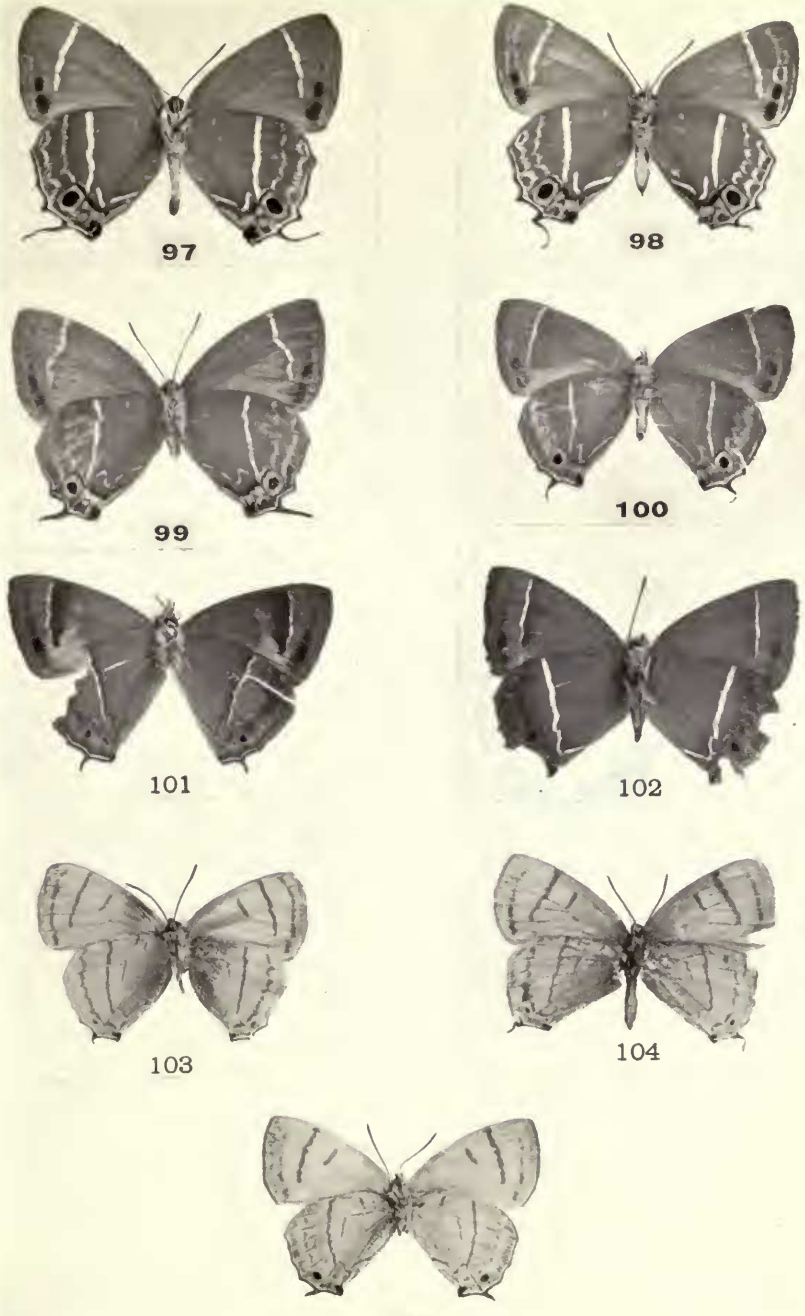
FIGS. 68–77. Uppersides of *Neozephyrus*: (68) *yunnanensis* sp. n. holotype male, (69) *yunnanensis* sp. n. allotype female, (70) *tienmushanus* male, (71) *tienmushanus* neallotype female, (72) *chinensis* sp. n. holotype male (73) *chinensis* sp. n. allotype female, (74) *souleana* Riley holotype male, (75) *souleana angustimargo* ssp. n. holotype male, (76) *disparatus* sp. n. holotype male, (77) *disparatus interpositus* ssp. n. holotype male.



FIGS. 78–87. Undersides of *Neozephyrus*: (78) *yunnanensis* sp. n. holotype male, (79) *yunnanensis* sp. n. allotype female, (80) *tienmushanus* male, (81) *tienmushanus* neallotype female, (82) *chinensis* sp. n. holotype male, (83) *chinensis* sp. n. allotype female, (84) *souleana* Riley holotype male (85) *souleana angustimargo* ssp. n. holotype male (86) *disparatus* sp. n. holotype male, (87) *disparatus interpositus* ssp. n. holotype male.



FIGS. 88–96. Uppersides of *Neozephyrus* and *Austrozephyrus*: (88) *N. helenae* sp. n. holotype male, (89) *N. helenae* sp. n. allotype female, (90) *N. dubernardi* Riley holotype male, (91) *N. taiwanus* Wileman holotype female, (92) *A. absolon malayicus* Pendlebury holotype female, (93) *A. borneanus* Pendlebury holotype male, (94) *N. triloka* Hannyngton, neallotype male, (95) *N. triloka* Hannyngton holotype female. (96) *N. bhutanensis* sp. n. holotype male,



FIGS. 97–105. Undersides of *Neozephyrus* and *Austrozephyrus*: (97) *N. helenae* sp. n. holotype male, (98) *N. helenae* sp. n. allotype female, (99) *N. dubernardi* Riley holotype male, (100) *N. taiwanus* Wileman holotype female, (101) *A. absolon malayicus* Pendlebury holotype female, (102) *A. borneanus* Pendlebury holotype male, (103) *N. triloka* Hannyngton neallotype male, (104) *N. triloka* Hannyngton holotype female, (105) *N. bhutanensis* sp. n. holotype male.

NEUROPTERA AND TRICHOPTERA COLLECTED BY MR. J. D. BRADLEY ON GUADALCANAL ISLAND, 1953-54

D. E. KIMMINS

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 5 No. 7
LONDON: 1957

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BY

D. E. KIMMINS

Pp. 287–308 ; *Text-figures* 1–16

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This paper is Vol. 5, *No.* 7 *of the Entomological series.*

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NEUROPTERA AND TRICHOPTERA COLLECTED BY MR. J. D. BRADLEY ON GUADALCANAL ISLAND, 1953-54

By D. E. Kimmins

During the period of the British Museum Expedition to Rennell Island Mr. J. D. Bradley also made collections on Guadalcanal Island. The Neuroptera only amounted to fourteen examples, two species of Myrmeleonidae and one of Chrysopidae, none being endemic.

The Trichoptera of the Solomon Islands as a whole appear to be almost completely unknown and I have only been able to trace one species described from Solomon Island material (*Anisocentropus solomonis* Banks). One other species, *Notanatolica magna* (Walker) was taken on Rennell Island by both the Danish and British Expeditions. This apparent scarceness can only be due to lack of collecting since during the periods that Mr. Bradley worked on Guadalcanal Island, he took no fewer than fourteen species, all but two of which are described as new in this paper. Of the other two, one may be *Anisocentropus solomonis* Banks and the other is a species of *Nyctiophylax* represented by a single female.

The types of all new species are in the British Museum (Natural History).

NEUROPTERA

Family Myrmeleonidae

Distoleon lentus (Walker)

Honiara, 10–14.ix., 3, 5–9.x.1953, 2 ♂, 7 ♀.

Tapenanje, 10–23.xii.1953, 1 ♀.

Distribution. Ceylon, India, Burma, Malaya, Hainan, Java, New Guinea, Queensland, New Hebrides, New Britain, Solomon Islands, Fiji.

Myrmeleon celebensis McLachlan

Honiara, 5–14.x.1953, 5–11.i.1954, 2 ♀, 1 ?.

Distribution. Celebes, Malaya, Sumatra, New Guinea, Aru Islands, New Hebrides.

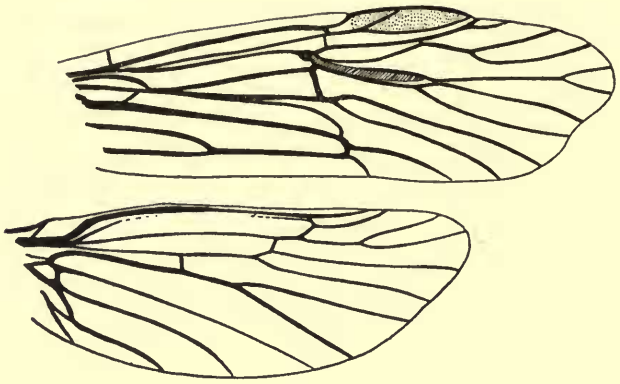

FIG. 1. *Apsilochorema rossi* sp. n. ♂ wings.

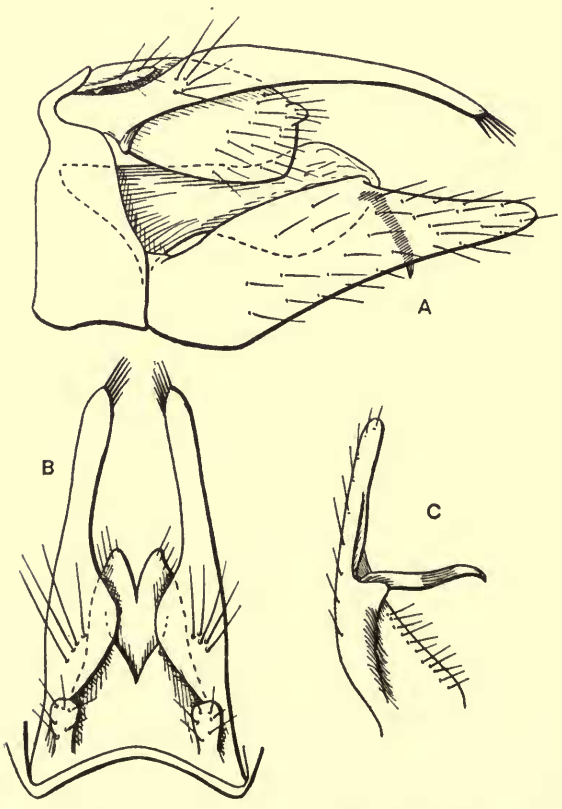

FIG. 2. *Apsilochorema rossi* sp. n. ♂ genitalia. (A), lateral; (B), tenth segment, dorsal; (C), right clasper, dorsal.

Family CHRYSOPIDAE

Italochrysa chloromelas (Girard)

Honiara, 4–11.i.1954, 1 ♀.

DISTRIBUTION. New Hebrides, New Caledonia, Lifu, Solomon Islands.

TRICHOPTERA

Family RHYACOPHILIDAE

Apsilochorema rossi sp. n. (Figs. 1, 2)

Tapenanje, 10–15.xii.1953, 1 ♂.

General colour varying shades of fuscous. Fore wing with R_{2+3} forming a small fork at apex. Cell M_1 very short. Wing-fold or pouch about as long as pterostigma, slender.

♂ GENITALIA. A strong process to seventh sternite. Ninth segment reduced dorsally to a narrow, transverse band. Tenth segment forming a short, transparent hood, quadrate from the side, excised apically from above. At its base on each side is a short, flattened cercus and a long, arched spine, which is dilated inwardly in the basal half and armed apically with a tuft of spines. Aedeagus short, stout, semi-membranous. Clasper long, moderately broad in basal half, then tapering to a rounded, finger-like apex. From the inner surface arises a slender, sinuous, inwardly directed spine, its basal attachment flexible.

Length of fore wing, 4·5 mm.

♂ type mounted as microscope preparations. This species is closely related to the Fijian *A. banksi* (Mosely). It differs in the fore wing in having R_2 and R_3 separated apically, a shorter cell M_1 and a longer fold in the centre of the wing. In the genitalia, the lateral processes of the tenth segment are longer and stouter, the segment is excised apically and the aedeagus stouter.

Synagapetus salomonis sp. n. (Fig. 3)

Tapenanje, 10–15.xii.1953, 2 ♂.

General colour medium fuscous, venation typical of *Synagapetus*, discoidal cell in fore wing short, about one and a half times as long as broad. In hind wing, R_2 and R_3 are fused throughout.

♂ GENITALIA. Sixth sternite with a long, slender, ventral process, arising from a large, conical base and projecting almost at right angles to the sternite. Ninth segment narrowed dorsally. Tenth segment forming a large and deep hood, obliquely and shallowly concavo-truncate apically in side view, apices slightly hooked inwards. Cercus short and truncate. Aedeagus stout, with a pair of stout, curved spines on its upper surface, apex clavate in side view, excised in dorsal view. Clasper rather slender, nearly as long as tenth segment, obliquely truncate apically.

Length of fore wing, 3·25 mm.

♂ type mounted as microscope preparations, ♂ paratype in 2% formaldehyde solution. This species is perhaps nearest to *S. crala* Mosely but differs in the more quadrate cerci, narrower claspers and differently formed aedeagus. Two females from Honiara, 9–10.x.1953, may possibly belong to this species.

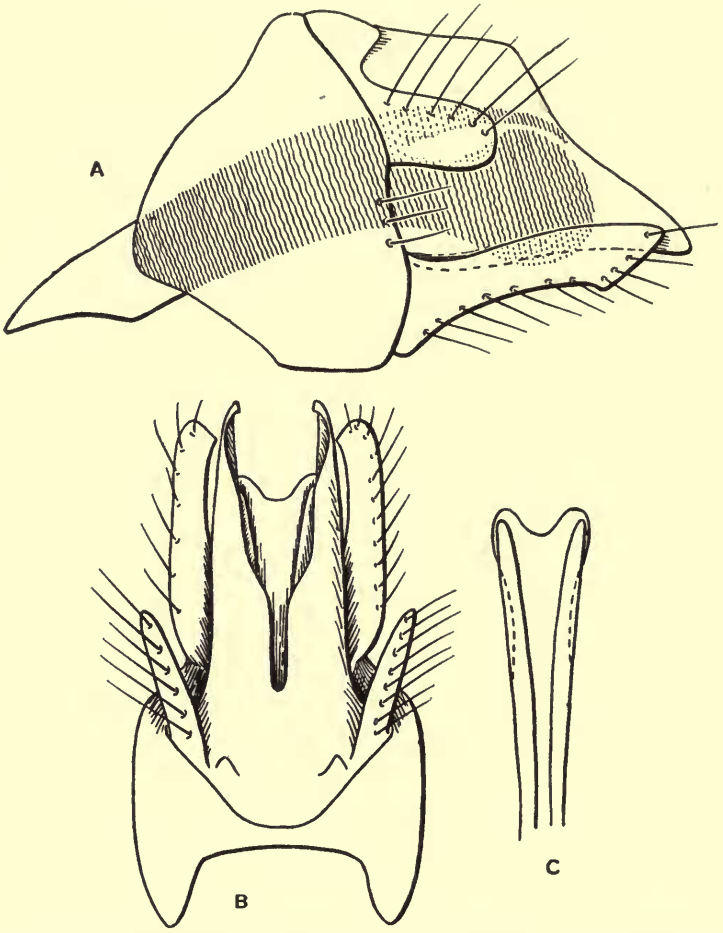

FIG. 3. *Synagapetus salomonis* sp. n. ♂ genitalia. (A), lateral; (B), dorsal; (C), aedeagus, dorsal.

Family PHILOPOTAMIDAE

Chimarra biramosa sp. n. (Figs. 4A, 5)

Tapenanje, 10–15.xii.1953, 2 ♂, 6 ♀.

Head castaneous, warts light ochraceous, antennae (incomplete) greyish ochraceous, palpi fuscous. Thorax castaneous above, with the pronotal and meso-

scutellar warts ochraceous, sides lighter ochraceous. Abdomen pale fuscous, pleurae ochraceous, genital segment and genitalia piceous. Wings (denuded) fuscous, venation as in Fig. 4A.

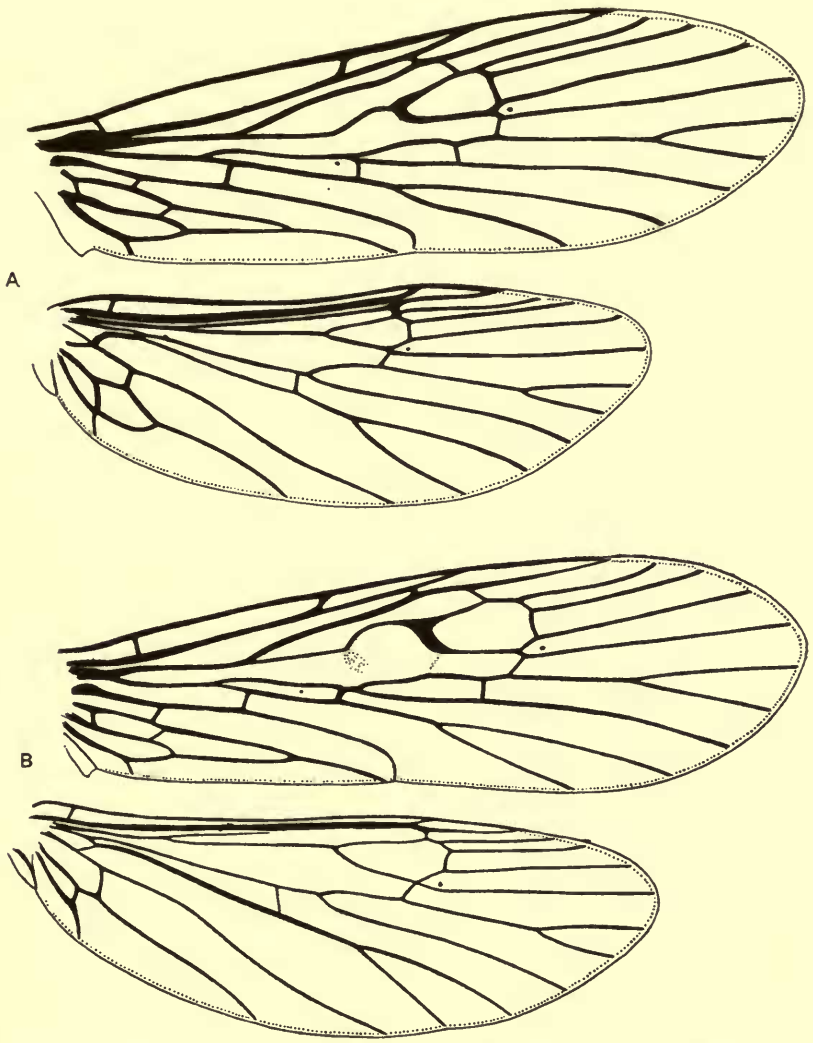

FIG. 4. *Chimarra* spp. n. ♂ wings. (A), *C. biramosa*; (B), *C. aureofusca*.

♂ GENITALIA. Eighth tergite with the centre of its apical margin excised. Ninth segment narrowed above and with a narrow, keel-like ventral process. Tenth segment long, hood-like, the sides strongly sclerotized and forming tapering, blunt blades, curving down on each side of the aedeagus. Central part of tenth segment membranous. Cercus short and rounded. Aedeagus with a membranous apex

and enclosing a short, blackened spine. Clasper in side view terminating in two widely separated branches, the lower the narrower. From above, this lower branch is seen to be a broad lobe with a small, hooked apex. At its base on the upper surface a small, plate-like projection or branch can be seen in a cleared example.

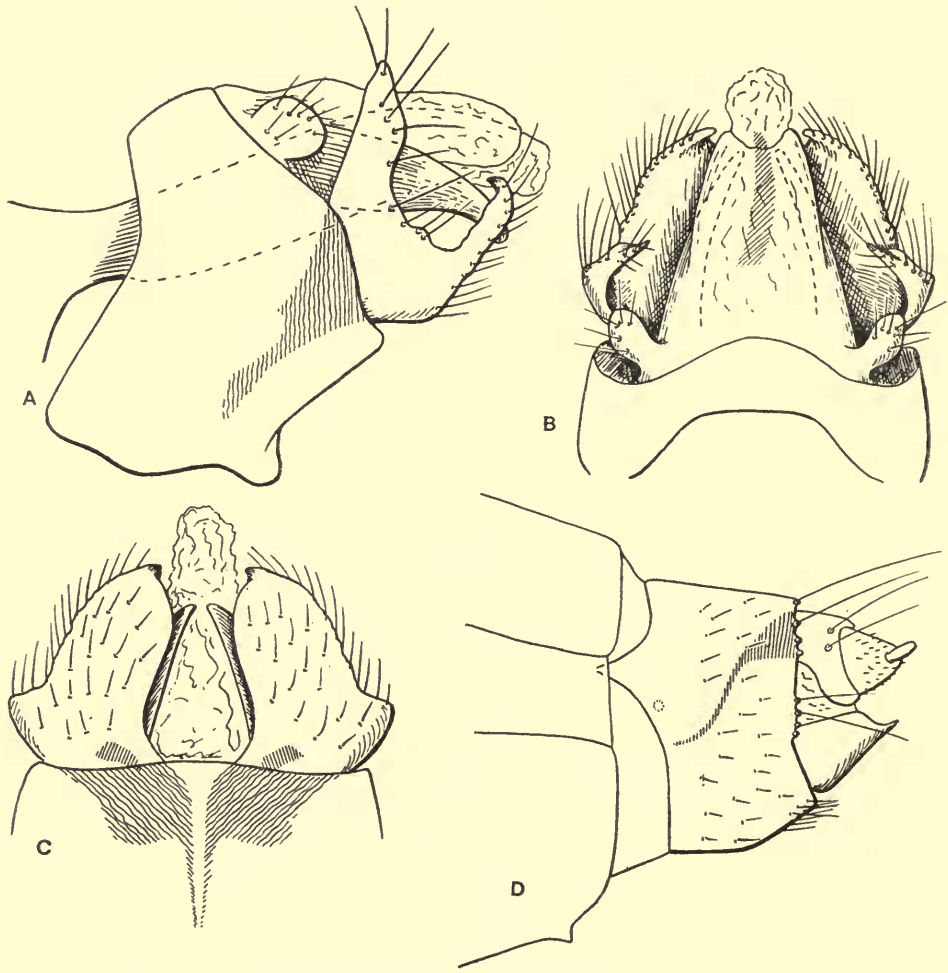

FIG. 5. *Chimarra biramosa* sp. n. Genitalia. (A), ♂, lateral; (B), ♂, dorsal; (C), ♂, ventral; (D), ♀, lateral.

♀ GENITALIA. Seventh sternite with a small ventral process. Eighth segment annular, apical margins fringed laterally with long setae. Ninth tergite arched, with long, sinuous, basal apodemes, sternite with two triangular sclerites, their inner margins touching. Tenth segment with a pair of short, single-segmented cerci.

Length of fore wing, 4·5 mm.

♂ type, ♀ allotype (with ♂ wings, ♂ and ♀ abdomens mounted as microscope preparations), and paratypes in 2% formaldehyde solution. This species differs from all the Australasian species known to me in the widely bifid claspers of the male.

Chimarra sp.

Tapenanje, 10–15.xii.1953, 2 ♀.

These specimens are paler than the females of *C. biramosa* sp. n., they show some differences in venation and in genitalia, but in the absence of males I do not propose to give them a name.

Chimarra aureofusca sp. n. (Figs. 4B, 6)

Honiara, 4–8.x.1953, 1 ♂, 1 ♀.

General colour golden brown. Head densely clothed with short, fuscous pubescence, warts not conspicuously paler, antennae and palpi pale fuscous. Thorax

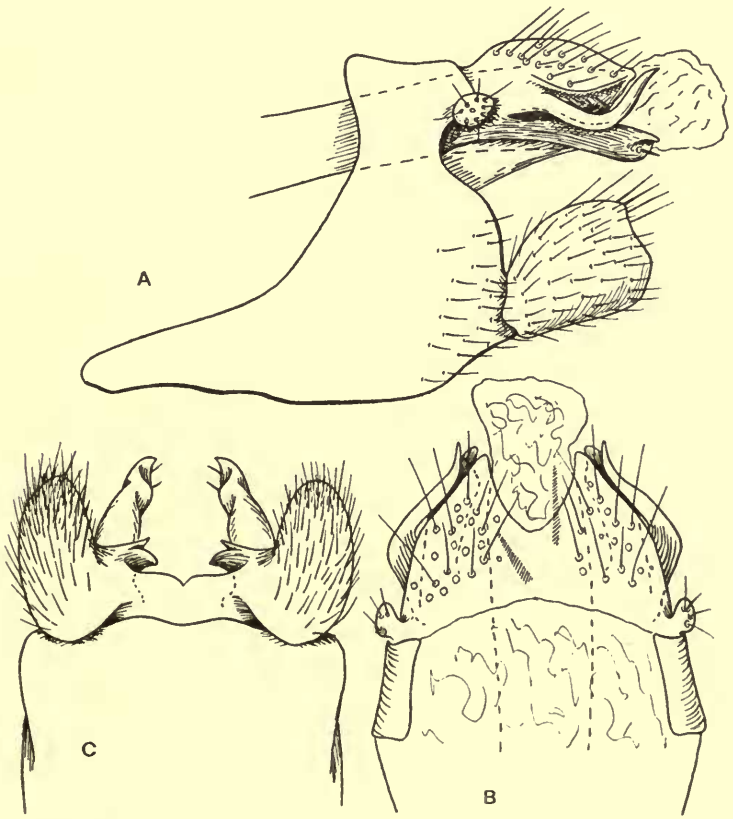

FIG. 6. *Chimarra aureofusca* sp. n. ♂ genitalia. (A), lateral; (B), ninth and tenth segments, dorsal; (C), claspers and aedeagus, ventral.

fuscous above, mesoscutellar warts concolorous. Legs pale fuscous, spurs fuscous. Abdomen golden brown, pleurae paler. Wings pale yellowish brown, with traces of fuscous pubescence, venation and margins fuscous. *Rs* in fore wing strongly sinuous, discoidal cell subquadrate. Thyridial and median cells of about equal length. In the hind wing, *Rs* is obsolete or fused with *Sc* about mid-way. *2A* running into and fusing with *3A*, not joining *1A* to form a closed cell as in *C. biramosa*.

♂ GENITALIA. Ninth tergite membranous above, ventral surface much produced basally. Tenth segment flattened, plate-like, excised at the centre of its apical margin to form two triangular lobes, densely covered with long setae. From its lower, lateral margins near the base arise on each side two spines, the upper slender, sinuous and acute, the lower stout, straight, its inner margin corrugated. Cercus short, rounded, set laterally near the base. Aedeagus long, apex membranous and enclosing two short, black spines. Claspers short, stout, from the side truncate apically. From beneath they are ovate, their inner margins fused in a transverse plate and produced in bifid processes, upper acute, lower rounded.

♀. Similar to male in general appearance. GENITALIA. Eighth, ninth and tenth segments produced to form a narrow ovipositor, terminating in a pair of single-segmented cerci.

Length of fore wing, 4·25 mm.

♂ type, ♀ allotype in 2% formaldehyde solution, ♂ with one pair of wings and genitalia, ♀ with genitalia, mounted on microscope slides. This species does not appear to have any close relationship with any of the Australasian species known to me. The venation of the fore wing resembles that of *C. thienemanni* Ulmer in the strongly sinuate *Rs* and subquadrate discoidal cell, but in the hind wing the discoidal cell is larger and there is no closed anal cell between *1A* and *2A* The genitalia differ widely in pattern.

Family POLYCENTROPODIDAE

Polyplectropus bradleyi sp. n. (Figs. 7, 8)

Honiara, 4–8.x.1953, 1 ♂, 1 ♀.

Tapenanje, 10–15.xii.1953, 5 ♂, 3 ♀.

Head fuscous, with pale ochraceous warts. Antennae ochraceous, moderately stout (incomplete). Palpi ochraceous. Pronotum ochraceous, meso- and metanota fuscous, scutellum and scutal warts of mesothorax ochraceous. Legs dull ochraceous. Abdomen ochraceous. Wings pale fuscous, with slightly darker veins, neuration typical of genus.

♂ GENITALIA. Upper part of ninth segment membranous, projecting beyond the eighth as a small, triangular lobe. Centre of ventral margin produced and hairy. Tenth segment divided dorsally, complex. From the side it forms a short, deep plate with a rounded apical margin, its lower apical angle produced in three branches. The upper is more sclerotized and forms an incurving hook. Below it is a transparent, hairy finger and within this at its base is a shorter, flattened, triangular

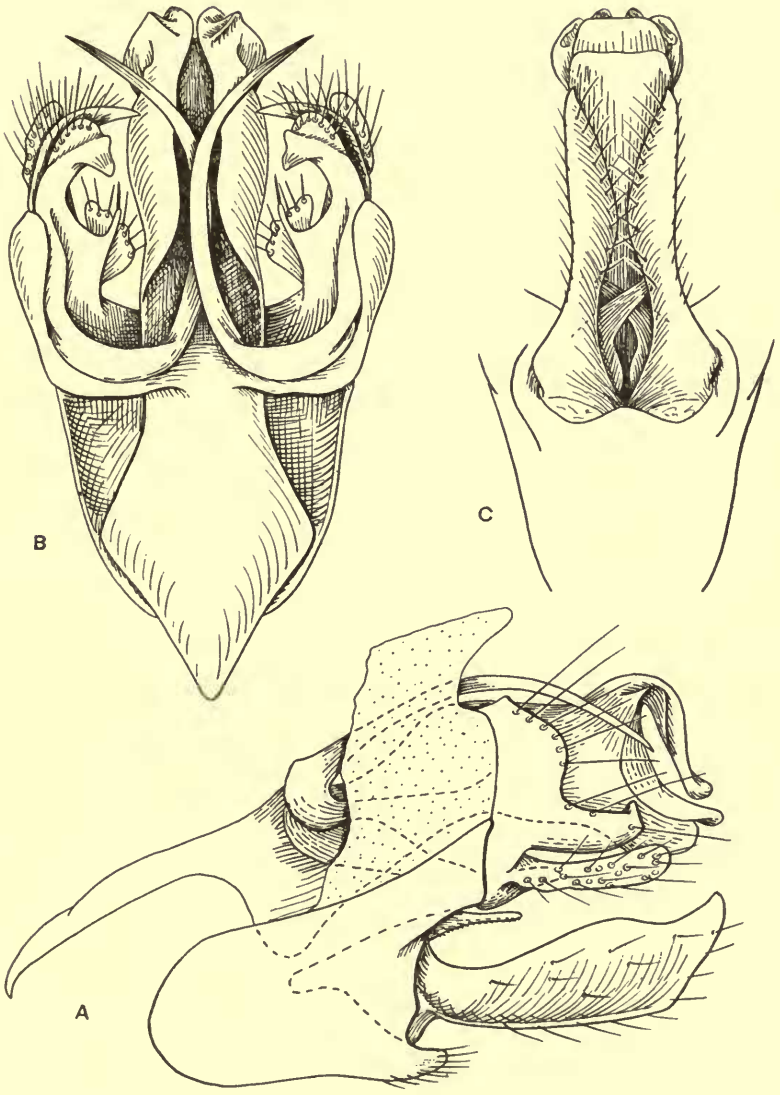

FIG. 7. *Polyplectropus bradleyi* sp. n. ♂ genitalia. (A), lateral; (B), dorsal (upper part of ninth segment omitted); (C), claspers and aedeagus, ventral.

lobe, fringed with hairs. This is more clearly seen in a preparation in dorsal aspect, in which aspect can also be seen a short, transparent finger, lying above it. From the basal margin of the tenth segment arises a slender spine, directed first basally, then curving apically and downward, situated above and to one side of the aedeagus. The latter is stout, with a pair of thin, narrow plates arising from its dorsal surface near the apex and curving sinuously down towards it. Clasper sinuous, apex slightly dilated, obliquely truncate. From beneath, the apex is acute. The outer surface of the clasper is concave and at the base there is a short, inner branch.

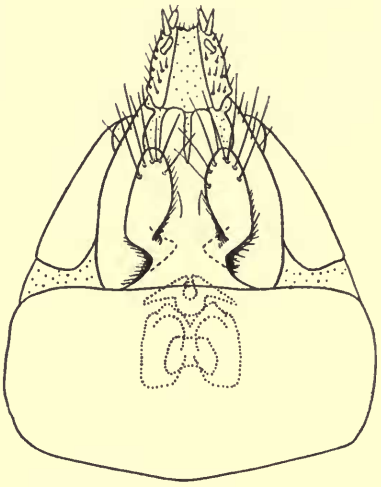

FIG. 8. *Polyplectropus bradleyi* sp. n. ♀ genitalia, ventral.

♀. Resembling male in coloration, antennae a little more slender. Median tibia moderately dilated. Ninth tergite narrowed above, lateral gonapophyses spatulate. Tenth segment short, with three pairs of apical processes, median pair acute, others rounded.

Length of fore wing, 4 mm.

♂ type, ♀ allotype (Tapenanje) in 2% formaldehyde solution, wings of ♂ and abdomens of ♂ and ♀ mounted as microscope preparations, paratypes in 2% formaldehyde solution. This species appears to approach *P. javanicus* Ulmer in the structure of the male genitalia, especially in the side view of the clasper and in the presence of two long, curved spines. It differs in the more complex tenth segment and the produced centre of the ninth sternite. Ulmer does not figure the aedeagus of his species.

Nyctiophylax sp.

Tapenanje, 10–15.xii.1953, 1 ♀.

Family Hydropsychidae

Hydropsyche tapena sp. n. (Fig. 9)

Tapenanje, 10–15.xii.1953, 1 ♂.

General colour pale ochraceous, wings denuded of pattern. Antennae (incomplete) apparently without the customary spiral marking. Meso- and metanota marked with fuscous on the shoulders. Venation typical of the genus.

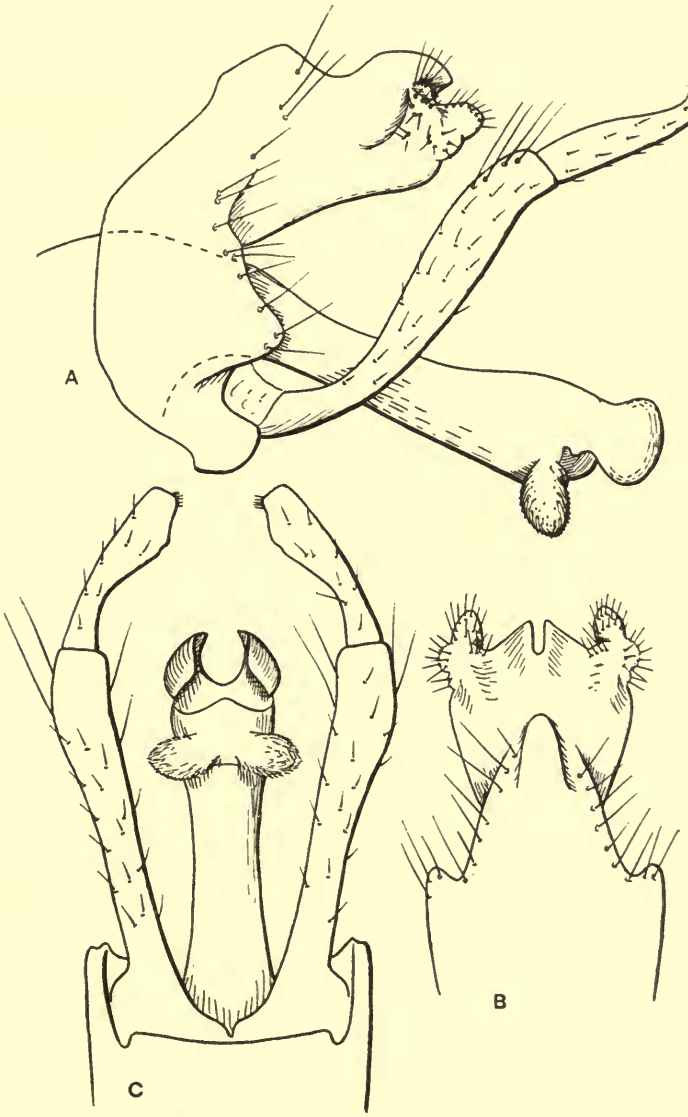

Fig. 9. *Hydropsyche tapena* sp. n. ♂ genitalia. (A), lateral; (B), ninth and tenth segments, dorsal; (C), claspers and aedeagus, ventral.

♂ GENITALIA. Ninth segment with large, triangular side-pieces, dorsal margin triangularly produced and fused with the tenth segment. The latter forms the usual hood; from the side the upper margin is strongly sinuous, terminating in a blunt hook. From above, this hook is medianly excised and forms two triangular lobes. Lateral angles of tenth segment with short, rounded processes, densely setose, and at their bases are some setose warts. Aedeagus slender, slightly clavate at its apex, which is divided into four lobes. Two are reniform in side view, hollowed on their inner surfaces and separated by a rounded excision. Below them are two somewhat roughened processes, capable of being directed downward and outward. Clasper long and slender, sinuous in side view, basal segment twice as long as apical; in ventral view, the latter is dilated internally in its apical half, apex truncate, with a tuft of short setae.

Length of fore wing, 9 mm.

♂ type in 2% formaldehyde solution, abdomen mounted as microscope preparation. This species resembles *H. tepoka* Mosely (New Zealand) in the form of the male genitalia, particularly in the quadrifid armature of the apex of the aedeagus, and the rather blunt processes of the tenth segment. The claspers are more slender and the apical segment proportionately longer. It may be mentioned here that in the New Zealand species of *Hydropsyche*, the cross-vein closing the median cell in the hind wing has proved rather unstable and is frequently absent, the venation thus resembling *Cheumatopsyche*. Mosely has, in fact, placed Tillyard's *philpotti* in this genus, in spite of the close resemblance of the male genitalia to *Hydropsyche colonica* McLachlan. There is, however, another character which can be used to separate *Hydropsyche* and *Cheumatopsyche*, namely the relative degree of separation of *M* and *Cu* in the hind wing. In *Hydropsyche*, *M* and *Cu* run very close together in the basal half of the wing, whereas in *Cheumatopsyche* they are well separated. On these grounds, Tillyard's *philpotti* should be returned to *Hydropsyche*.

Family HYDROPTILIDAE

Hydroptila triloba sp. n. (Fig. 10)

Honiara, 4–8.xii.1953, at light, 4 ♂, 7 ♀.

The wings show traces of fuscous bands near base and about mid-way. In the ♂ the antennae have about thirty segments, and there are two pyriform scent-organ caps on the back of the head, but I have been unable to make out any scent-organs.

♂ GENITALIA. Ninth segment with its dorsal, apical margin projecting in a short triangle; ventral margin widely excised, the lateral margins forming short, blunt fingers, carrying a few setae. Tenth segment fused to ninth, lightly sclerotized, long, deeply excised in dorsal aspect, and with a semi-membranous, truncate plate between the lateral arms, but separated from them, except at the base. In side view, the lateral arms are slightly clavate. At the base of the excision is an elevated acute tooth. Aedeagus long, slender, with the usual twisted spine or sheath. Claspers long, narrow, slightly down-curved with blunt apices. The outer surfaces carry a number of stout, socketed teeth and above the bases of the claspers is a

lightly sclerotized, pointed plate, a little shorter than the claspers, and also with two similar teeth on its lower surface. There is a short, pointed ventral process on the seventh segment.

Length of fore wing, 2 mm.

♂ type mounted as microscope preparation, paratypes in 2% formaldehyde solu-

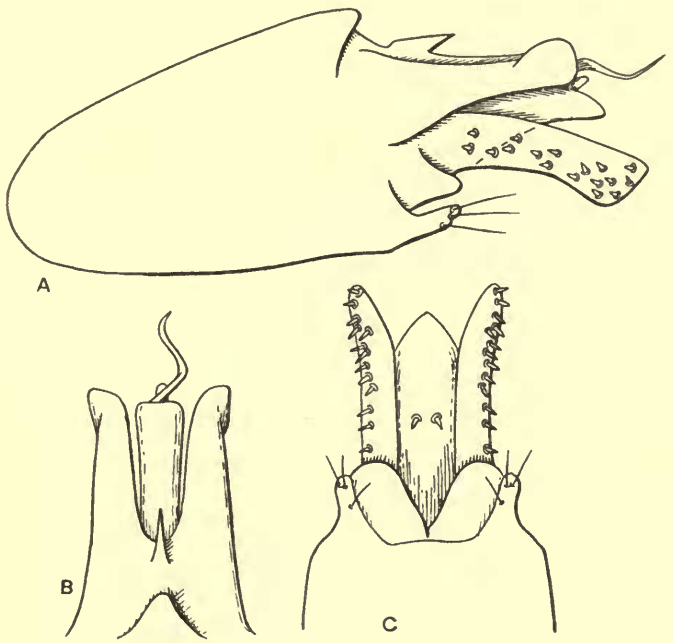

FIG. 10. *Hydroptila trilobata* sp. n. ♂ genitalia. (A), lateral; (B), tenth segment and aedeagus, dorsal; (C), claspers, ventral.

tion. This species is closely allied to *Hydroptila incertula* Mosely (S. Queensland). It differs in the presence of a short, acute tooth at the base of the excision of the tenth segment, the clavate apices of the lateral arms of this excision and the less down-curved claspers.

Family CALAMOCERATIDAE

Anisocentropus sp.

Tapenanje, 10–15.xii.1953, 2 ♂, 1 ♀.

These specimens have the wings completely denuded of pubescence. They may possibly be *Anisocentropus solomonis* Banks, described from two females as having a broad, irregular band of blueish or purplish scales on the fore wing, but in view of the denuded state of the present specimens, I think it better not to attempt to identify them beyond the genus.

Family Leptoceridae

Oecetis reticulata sp. n. (Fig. 11)

Honiara, 4–8.x.1953, at light, 1 ♂.

General colour very pale fuscous, membrane of fore wing shaded with deeper fuscous at the anastomosis and at the main forks.

♂ GENITALIA. Eighth tergite produced in a large, reticulated shield, covering the ninth and tenth segments from above. It is pale waxy yellow, bordered with dark brown. Preceding tergites normal. Ninth segment with its upper part reduced

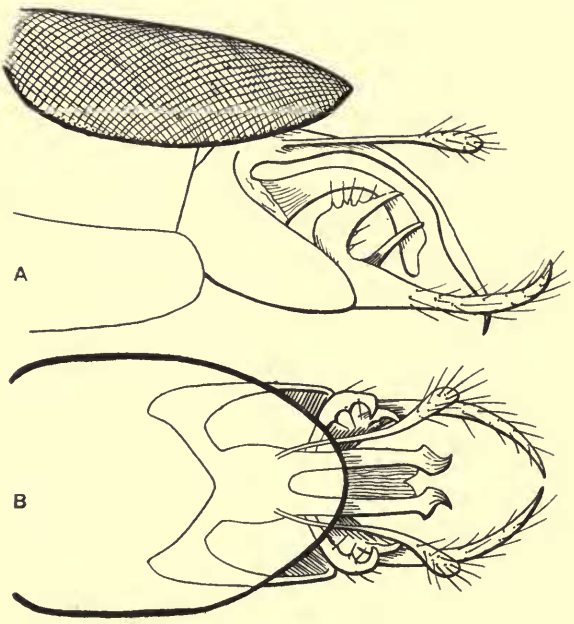

FIG. 11. *Oecetis reticulata* sp. n. ♂ genitalia. (A), lateral; (B), dorsal.

to a narrow, transverse band, to which is attached the tenth segment. This takes the form of two long, slender, down-curved spines, each dilated laterally before the acute apex. At their bases arise the cerci, shorter than the spines, slender, with moderately clavate apices. Aedeagus short, down-curved. Claspers broad and contiguous basally, each soon tapering to a slender, calliper-like apex, projecting beyond the tenth segment. At its base arise two short, curved branches, directed upward and tailward, the basal branch on the upper margin distinctly serrate, the other arising nearer the inner margin.

Length of fore wing, 4·5 mm.

♂ type mounted as a microscope preparation. In the shield-like eighth segment and slender, clavate cerci this species resembles *O. testacea* (Curtis), but it differs from most of the species with reticulated tergites in having only the eighth so formed.

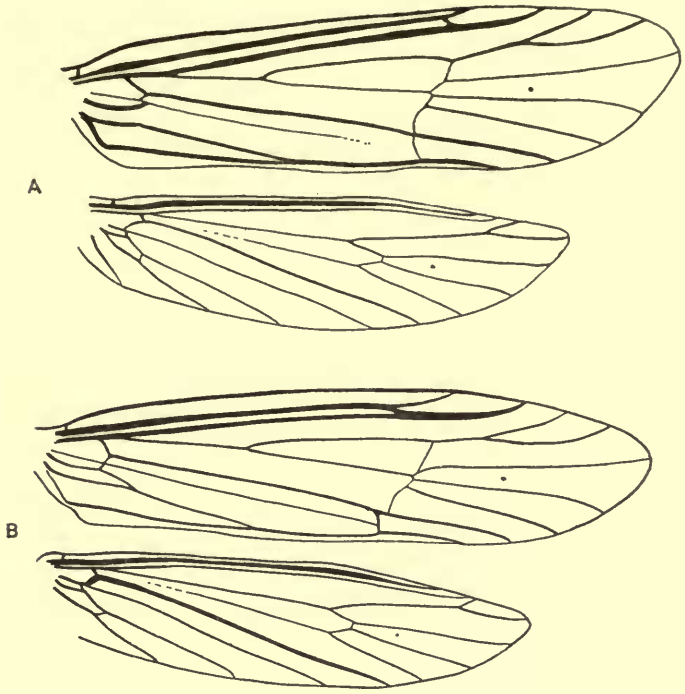

FIG. 12. *Triaenodes* spp. n. ♂ wings. (A), *T. picea*; (B), *T. excisa*.

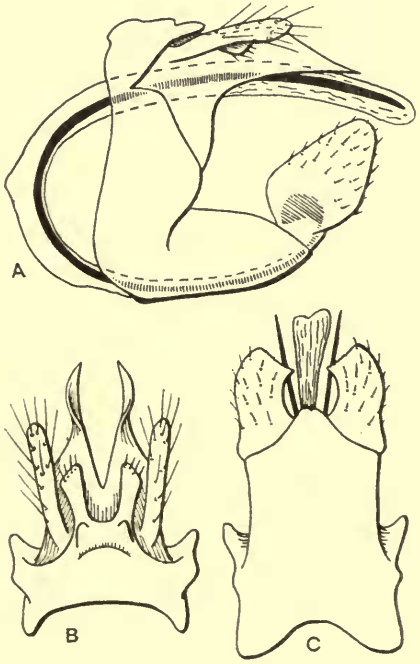

FIG. 13. *Triaenodes picea* sp. n. ♂ genitalia. (A), lateral; (B), ninth and tenth segments, dorsal; (C), ninth segment, claspers and aedeagus, ventral.

Triaenodes picea sp. n. (Figs. 12A, 13)

Tapenanje, 10–15.xii.1953, 3 ♂.

General colour of the body and fore wings piceous, the anastomosis of the latter white. Antenna with the two basal segments piceous, remainder pale fuscous, with darker annulations. The basal segment has on its inner surface a whitish false suture, somewhat simulating the scent-organ cap in certain species of *Triaenodes* (*Triaenodella*). There are indications of a tuft of long hairs on the inner surface. Palpi and legs fuscous. Venation fairly typical of *Triaenodes*, in fore wing Cu_1 is a strong vein, running straight to the wing margin. The free, basal part of Cu_1 is very weak, resembling a cross-vein, apical part fused with the extended anal vein. Cu_2 is more or less obsolete towards its apex, in the type not reaching the wing margin.

♂ GENITALIA. Ninth segment with its upper part reduced, apical margin produced in a pair of short thin, obliquely truncate lobes, separated by a U-shaped excision. Tenth segment forming a thin hood, from above deeply and acutely excised, the sides of the excision with acute apices. Cercus digitate, about two-thirds as long as tenth segment. Aedeagus long, slender, semi-membranous, stiffened by two sclerotized ribs. It apparently arises near the base of the claspers and thence runs basally before curving upward and tailward beneath the tenth segment. Running parallel with the aedeagus on each side is a long, slender spine. Clasper short, stout, somewhat rhomboidal from the side, truncate apically from beneath, with a serrate ridge on its inner surface.

Length of fore wing, 5 mm.

♂ type mounted as a microscope preparation, 2 ♂ paratypes in 2% formaldehyde solution. The genitalia of this species are similar in pattern to those of a number of North American species of *Triaenodes*, though of course differing in detail. It is quite distinct from its nearest geographical neighbours, *T. volda* Mosely and *T. insulana* Ulmer.

Triaenodes excisa sp. n. (Figs. 12B, 14)

Tapenanje, 10–15.xii.1953, 1 ♂.

General colour dark ochraceous. Antenna with long basal segment, its inner surface with a dense tuft of hairs, which become detached by clearing in caustic potash solution for preparation. Wing venation more typical of *Triaenodes* than in *T. picea*, Cu_2 terminating in Cu_{1b} in fore wing. Apex of fore wing less broadly rounded.

♂ GENITALIA. Ninth segment with the lower part only slightly projecting. Dorsal apical margin produced in two small, rounded lobes and below them a pair of bifid fingers. Tenth segment forming a bifid hood, the branches acute from above, rounded apically from the side. Cerci digitate, slightly longer than the bifid fingers of the ninth segment. Aedeagus and spines much as in *T. picea*. Claspers stout, about as long as ninth segment. From the side each is pyriform, narrowest at base, apex excised and armed with teeth.

Length of fore wing, 4·5 mm.

♂ type mounted as a microscope preparation. This species is closely related to *T. picea* sp. n., but differs in its more normal venation, less broadly rounded apex of fore wing, longer and bifid processes to the ninth segment, differently shaped tenth segment, shorter lower part of ninth segment and larger, pyriform claspers.

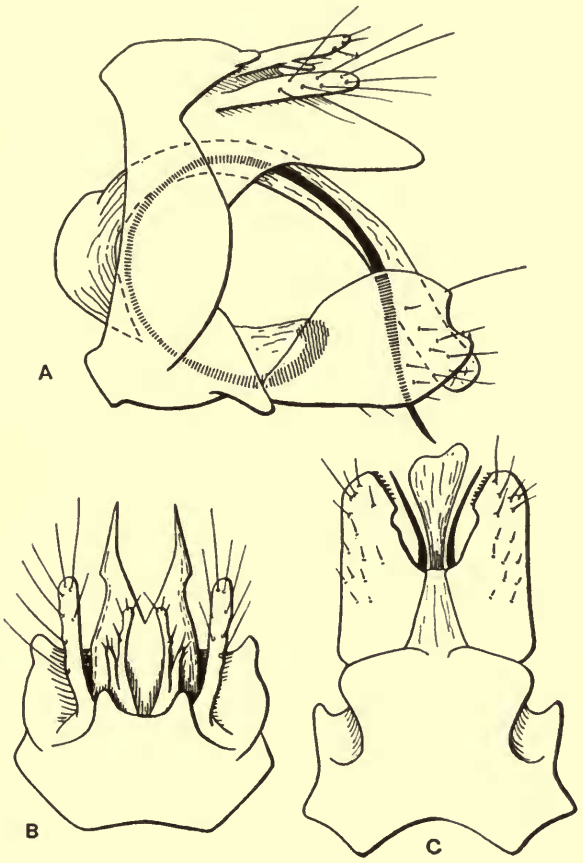

FIG. 14. *Triaenodes excisa* sp. n. ♂ genitalia. (A), lateral; (B), ninth and tenth segments, dorsal; (C), ninth segment, claspers and aedeagus, ventral.

Triaenodes trifida sp. n. (Fig. 15)

Tapenanje, 10–15.xii.1953, 2 ♂.

General colour ochraceous, head and thorax rather darker. Antenna light ochraceous with darker annulations. Basal segment with a suture along its upper surface, from which can be exserted a membrane, covered with scales. In a fluid-preserved specimen these scales can be seen as a reddish mass within the segment. Wings more acute apically than in *T. excisa*, venation much as in the two previous species.

♂ GENITALIA. Ninth segment reduced dorsally to a narrow, transverse band. Tenth segment composed of a very long, slender, pale finger, arched from the side, slightly clavate and setose apically. On either side of this central process is an even longer, downwardly curved, slender spine. Cerci short, digitate. Aedeagus long, moderately slender, its apex deeply bifid and membranous. Clasper about as long as ninth segment, from the side about two and a half times as long as wide, apex terminating in a small hook. The inner basal angles are fused and produced tailward in a pair of divergent, downwardly curved blades, with rounded apices.

Length of fore wing, 3·25 mm.

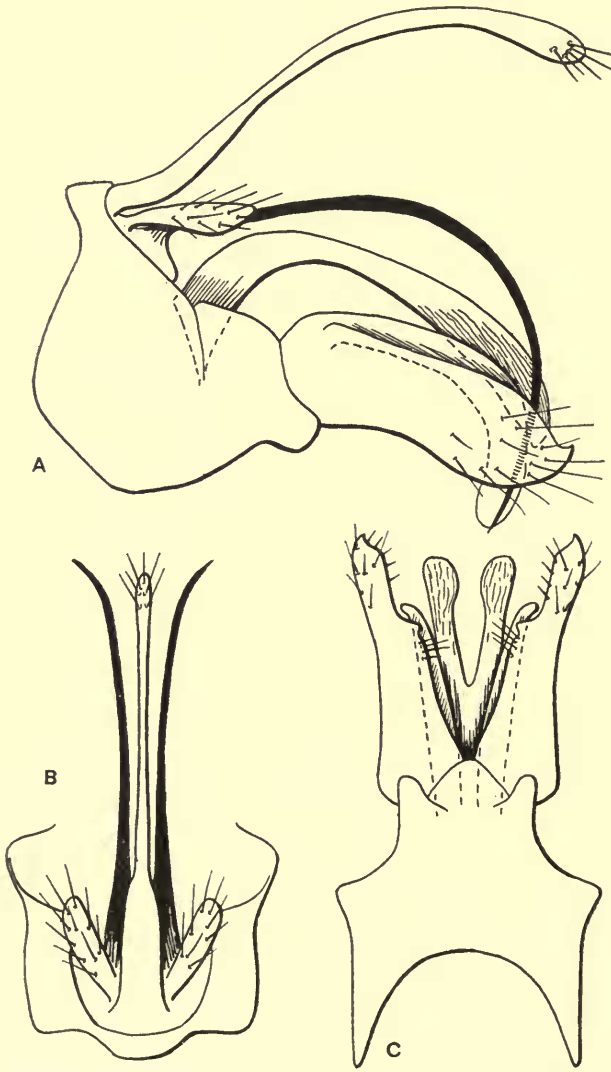

FIG. 15. *Triaenodes trifida* sp. n. ♂ genitalia. (A), lateral; (B), ninth and tenth segments, dorsal; (C), ninth segment, claspers and aedeagus, ventral.

♂ type mounted as a microscope preparation, ♂ paratype in 2% formaldehyde solution. The presence of scent scales on the basal segment of the antenna recalls the tuft of scent hairs on the antenna of *Triaenodes chelifera* (Mosely), but in the present species there is no flap-like cover, the scales being on a membrane and when not exserted, are housed within the basal segment. *T. trifida* differs from the two previous species in the long median process and lateral spines of the tenth segment, and the shorter and broader, blade-like processes from the bases of the claspers, which latter are even more elongate.

Triaenodes lanceolata sp. n. (Fig. 16)

Tapenanje, 10–15.xii.1953, 1 ♂.

General colour dark ochraceous, fore wing membrane pale fuscous. Antennae broken, basal segment of each without scent scales. Maxillary palpi incomplete. Venation typical of genus.

♂ GENITALIA. Ninth segment nearly as long dorsally as ventrally, dorsal apical margin triangularly produced at its centre. Tenth segment composed of a narrow lanceolate plate, fringed with teeth and below it a thin hood, apical margin acutely

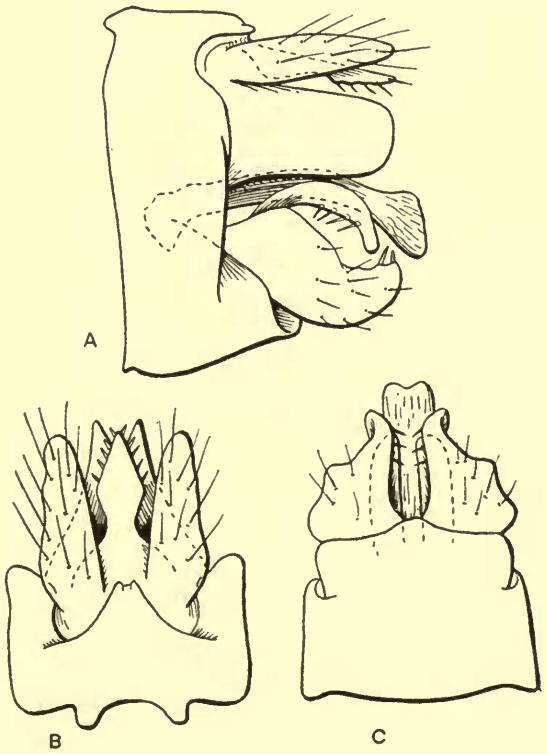

FIG. 16. *Triaenodes lanceolata* sp. n. ♂ genitalia. (A), lateral; (B), ninth and tenth segments, dorsal; (C), ninth segment, claspers and aedeagus, ventral.

excised in dorsal view, about as long as median process. Cerci about as long as tenth segment, stout, digitate. Aedeagus short, moderately slender, its membranous apex slightly curved. Clasper about as long as ninth segment, stout and slightly upcurved from the side, broad at base beneath, outer margin sinuously converging to make a slender apex, which is toothed on its inner surface.

Length of fore wing, 8·25 mm.

♂ type mounted as microscope preparations. This species differs from those previously described in this paper in the shorter, less curved aedeagus, the less reduced upper part of the ninth segment and the different form of the tenth segment.

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D. E. KIMMINS

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 5 No. 8
LONDON: 1957

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Pp. 309–320 ; *Text-figures* 1–5

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ODONATA COLLECTED BY MR. J. D. BRADLEY ON GUADALCANAL ISLAND, 1953-54

By D. E. KIMMINS

THE Odonata dealt with in this paper were collected by Mr. Bradley during stops on Guadalcanal on his way to and from Rennell Island. The Odonata of Guadalcanal are better known than the Trichoptera, and Lieftinck (1949) lists twenty-eight species. Mr. Bradley collected fourteen species of which six were additions to those listed by Lieftinck, these six including at least three new species and two new genera. There is a high proportion of species endemic to the Solomon Islands, no fewer than fourteen of the total of thirty-four being restricted to the Solomons.

The types of the new species are in the British Museum (Natural History).

ODONATA

ZYGOPTERA

Family LIBELLAGINIDAE

Rhinocypha liberata Lieftinck

Tapenanje, 10–23.xii.1953, 22 ♂, 11 ♀.

The present examples differ slightly from Lieftinck's description and from Solomon Islands specimens (ex McLachlan collection), determined by myself as *R. liberata*, but I do not consider the differences to justify the erection of a new subspecies. The specimens are a little larger and the brown apices of the wings appear to be a little more extensive. In many examples the infuscation of the fore wing extends almost completely to the apical margin, even in teneral specimens, and in none is the paler space distad of the pterostigma as distinct as in Lieftinck's description. In teneral examples the apical half of the pterostigma is pale cream.

♀. Humeral stripe a little less reduced than in ♂. Abdomen black, with a fine, yellowish, median carina. Sides of the segments marked with deep yellow : segment 1, one large spot ; segments 2–7 with two spots, the anterior the larger, the spots becoming progressively reduced towards apex of abdomen ; segment 8 with only one basal spot. Membrane of wings pale yellowish, hind wing with a brownish apical patch, varying in size and intensity in individuals up to nearly the apical third, paler along the costal margin. Extreme apex of wing narrowly opaque whitish. Fore wing sometimes with very indistinct brownish shading in apical third but not reaching extreme apex, which is also very narrowly opaque whitish. Pterostigma dark brown, apical half deep cream to reddish brown.

Family Protoneuridae

Notoneura salomonis (Selys)

Tapenanje, 10–23.xii.1953, 26 ♂, 15 ♀.

Distribution. Solomon Islands, New Britain, New Guinea.

Family Platycnemididae

LIEFTINCKIA gen. nov.

(Text-fig. 1)

♂. Head large, eyes conspicuous and globular. Mouth parts and clypeus projecting, about half as wide as distance between eyes. Median excision of labium U-shaped, about twice as deep as wide. Antenna with basal segment short, third about twice as long as first and second together. Prothorax without projections. Synthorax rather short. Legs slender, not unusually long, hind femur extending to apex of first abdominal segment. Tibiae not dilated ; tarsi of moderate length, claws with a strong, subapical tooth.

Wings (Text-fig. 1A) elongate, hyaline, distinctly petiolated, petiolation ceasing at level of first antenodal, distad of *Ac*. Apices of both wings with a finely undulated margin. Nodus situated at a little more than one-fourth the distance between base and the distal margin of the pterostigma (5 : 18) in fore wing and about one-third (7 : 22) in hind wing. Pterostigma large, irregularly lozenge-shaped, costal margin slightly concave, distal margin angled. Two rows of cells between *C* and R_1 beyond the stigma. Marginal course of M_4 and Cu_2 zigzag. Origins of *Rs* and M_3 close together, M_3 at or slightly before subnodus, *Rs* usually not more than half a cell beyond. Quadrilateral about three times as long as broad, lower basal angle acute. *Ac* situated distinctly basad of first antenodal cross-vein, *Ab* extending back to level of first antenodal in fore wing and to mid-way between first and second antenodal in hind wing.

Abdomen moderately slender. Posterior tergal margin of tenth segment somewhat elevated and with a triangular, median impression. Stalk of penis without lateral bristles. Distal segment arching backwards, rather narrow but dilating towards apex, which is widely excised, angles produced in spatulate lobes. Lamina interna slender, acute (Text-figs. 1D, E).

Superior anal appendages short, triangular, with a downwardly directed inner branch. Inferiors rather longer, narrowed to a finger apically.

♀. Much as in ♂. Posterior lobe of prothorax with the sides produced in deflexed rounded lobes. Between them the anterior margin of the mesepisternum is raised in a transverse, rounded process. Apex of abdomen somewhat damaged, superior anal appendages short and conical. Valves short, stout, slightly curved and tapering to blunt apices.

Type-species, ***Lieftinckia salomonis*** sp. n.

I am in some doubt as to the correct place of this genus within the Platycnemididae. The ♂ anal appendages recall those of *Platycnemis*, the superiors being shorter than the inferiors, with an internal, downwardly directed branch, but the tibiae show no sign of dilatation. *Ac* is situated relatively nearer to the base of the wing than in *Tatocnemis*, being basad of the first antenodal. The anal bridge does not reach *Ac*

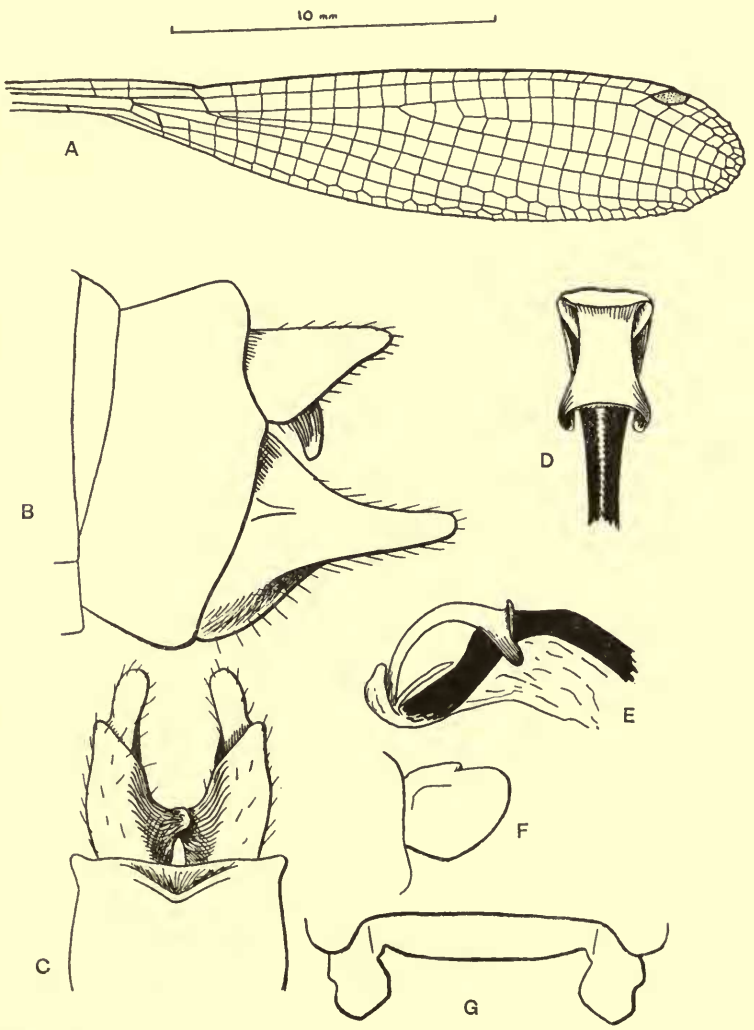

FIG. 1. *Lieftinckia salomonis* gen. et sp. n. ♂, ♀. (A), ♂ fore wing; (B), ♂ anal appendages, left lateral; (C), ♂ anal appendages, dorsal; (D), ♂ penis, ventral; (E), ♂ penis, left lateral; (F), ♀ posterior lobe of prothorax, left lateral; (G), ♀ posterior lobe of prothorax, dorsal.

but runs into the wing margin at the level of the first antenodal. The form of the posterior lobe of the prothorax in the female and the inflation of the anterior margin of the synthorax also have their counterparts in *Platycnemis*. The penis and the venation (apart from the position of *Ac*) resemble *Idiocnemis*, but the extreme basal position of *Ac* and the presence of two rows of cells between *C* and R_1 beyond the stigma will distinguish *Lieftinckia* from either *Platycnemis* or *Idiocnemis*.

It gives me much pleasure to name this interesting genus after Dr. M. A. Lieftinck, now at Leiden Museum, who has done so much to extend our knowledge of the Odonata of Papua, Indonesia and the associated islands.

Lieftinckia salomonis sp. n.

(Text-fig. 1)

Tapenanje, 10–23.xii.1953, 2 ♂, 1 ♀.

Specimens possibly rather teneral. General appearance cream, dorsum of synthorax dark brown, abdomen with paler brown markings.

♂. Head with labrum, bases of mandibles, clypeus, frons and vertex cream, occiput fuscous. Antenna with flagellum and apical half of second segment fuscous. Labium yellowish. Eyes dark brown.

Pronotum dark fuscous above, sides and venter creamy yellow. Posterior lobe of pronotum simple, margin broadly rounded. Synthorax with dorsum dark fuscous, which colour slightly overlaps the humeral suture, and a faint brownish streak along the posterior margin of mesepimerum, otherwise creamy yellow. Coxae, trochanters and femora yellowish, apices of the latter narrowly fuscous. Tibiae and tarsi dark brown.

Wings hyaline, veins dark brown, venation as in Text-fig. 1A and in generic description. Pterostigma pale brownish, narrowly bordered inside margins with cream.

Abdominal segments 1–6 cream, each with an apical annule of brownish, narrow on segment 1 and gradually increasing in width to segment 6. Segments 7–10 pale brownish (somewhat discoloured), anal appendages pale brownish.

Superior anal appendage (Text-figs. 1B, C) about as long as tenth segment, from the side triangular and with an acute apex. From above it is also acutely triangular, but the inner margin towards the base is produced downwards in a short, flattened finger, the inner upper margin thus appearing sinuate. Inferior appendage about one and a third times as long as superior, broad basally, tapering to a narrow, blunt finger, slightly incurved.

♀. Head as in ♂. Prothorax coloured as in ♂. Posterior lobe (Text-figs. 1F, G) transverse, with its lateral margins bent sharply downwards and produced backwards in rounded lobes, to form a wide, shallow, somewhat rectangular excision. Synthorax with its anterior margin inflated in a transverse, rounded lobe, its posterior margin feebly excised. Markings of synthorax and legs as in ♂. Wings much as in ♂. Abdomen cream, ringed with brownish as in ♂ on segments 1–6, coloration of remaining segments pale, obscure. Genitalia as in generic description.

Length of abdomen + appendages, ♂, 34–35 mm., ♀, 32 mm. ; hind wing, ♂, 23 mm., ♀, 23 mm.

Lieftinckia ? sp.

Tapenanje, 10–23.xii.1953, 1 ♀.

This rather teneral and crushed specimen is referred to *Lieftinckia* with some doubt. The position of the anal crossing and anal bridge is typical, but M_3 arises at the subnodus and *Rs* half to one cell beyond. The cells beyond the stigma are in one row only. The posterior lobe of the prothorax is not excised apically and the femora are more shaded with brownish. Tergites 3–7 of the abdomen have a median brownish band in addition to the apical one.

Family Coenagriidae

Pseudagrion incisurum Lieftinck

Tapenanje, 10–23.xii.1953, 9 ♂, 1 ♀.

Distribution. Guadalcanal.

Teinobasis bradleyi sp. n.

(Text-fig. 2)

Tapenanje, 10–23.xii.1953, 2 ♂ (1 incomplete).

♂. Labium and lower mouth parts very pale blue, mandible bases and genae bluish green. Labrum and clypeus black, shining, the latter with three small, blue-green spots along the anterior margin, postclypeus black, with a wide, transverse, blue-green stripe from side to side. Frons, vertex and occiput dull black, with a faint greenish sheen. Antennal bases blue-green in front, segments piceous.

Prothorax dull black above, sides light bluish, pruinescent. Posterior lobe simple, flattened, its distal margin evenly and shallowly rounded.

Synthorax (Text-fig. 2A) as far as the first lateral suture (and in the upper fifth to the second lateral suture) black, between the humeral sutures with a metallic greenish sheen. Mesepimerum with a small blue spot at its upper angle, adjoining the humeral suture. Remainder of synthorax blue, slightly pruinescent beneath. Coxae pale bluish, femora piceous above, pale bluish beneath, tibiae and tarsi reddish piceous. Spines black. Claws without inferior sub-apical tooth.

Wings hyaline, venation black. Apical margin very slightly and widely undulated or excised between Cu_1 and M_3, M_3 and M_2. Origin of M_3 slightly before, and *Rs* at, subnodus. Fifteen to sixteen postnodal cross-veins in fore wing, 14 in hind. Three postquadrangular antenodal cells. Cu_2 long, terminating at level of tenth postnodal. Pterostigma piceus, moderately oblique, about twice as long as high.

Abdomen slender, black above, segment 1 with a narrow, transverse, blue apical streak, and a rounded blue spot filling most of side. Segment 2 with an elongate blue patch on each side. Remaining segments with lower, lateral margins bluish or yellowish. Tenth segment with the median impressed area triangular. Anal

appendages as in Text-figs. 1B, C, superiors piceous, inferiors pale bluish at base, piceous apically.

♀ unknown.

Length of abdomen + appendages, ♂, 39 mm.; hind wing, 26 mm.

In form of genitalia, *T. bradleyi* forms one of a group of species in which the superior anal appendages are tapered and slightly incurved apically, extending beyond the

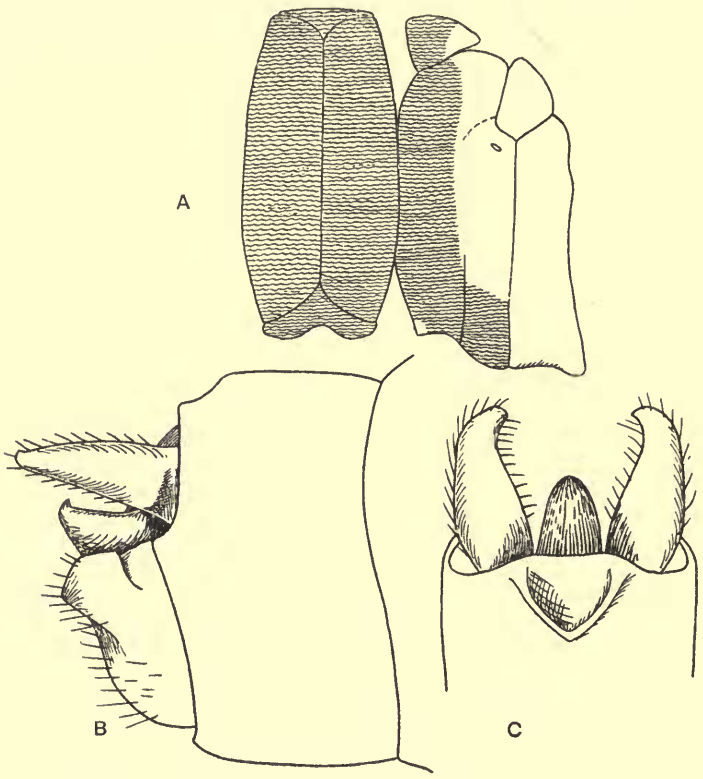

FIG. 2. *Teinobasis bradleyi* sp. n. ♂. (A), diagram of thoracic pattern; (B), anal appendages, right lateral; (C), anal appendages, dorsal.

inferiors. It most nearly approaches *T. metallica* Foerster, but the superiors are less abruptly tapered and the inferiors have the apex not acute but blunt and obtuse-angled. The thoracic colouring is less metallic and extends dorsally to the second lateral suture. The slight undulation of the wing apices recalls that in the genus *Leptocnemis*, but the appendages are rather different.

Agriocnemis salomonis Lieftinck

Honiara, 5–9.x.1953, 1 ♂.

DISTRIBUTION. Solomon Islands.

ANISOPTERA

Family CORDULIIDAE

GUADALCA gen. nov.

(Text-figs. 3, 4)

Eyes strongly globular, broadly contiguous. Frons moderately produced, not as broad as thorax (about half the width of the head and eyes). ♂ with a carina on the flexor surface of all tibiae on anterior and median legs occupying about the apical fourth, on the posterior extending almost the whole length of the tibia. Ventral surfaces of median and posterior femora armed with numerous short,

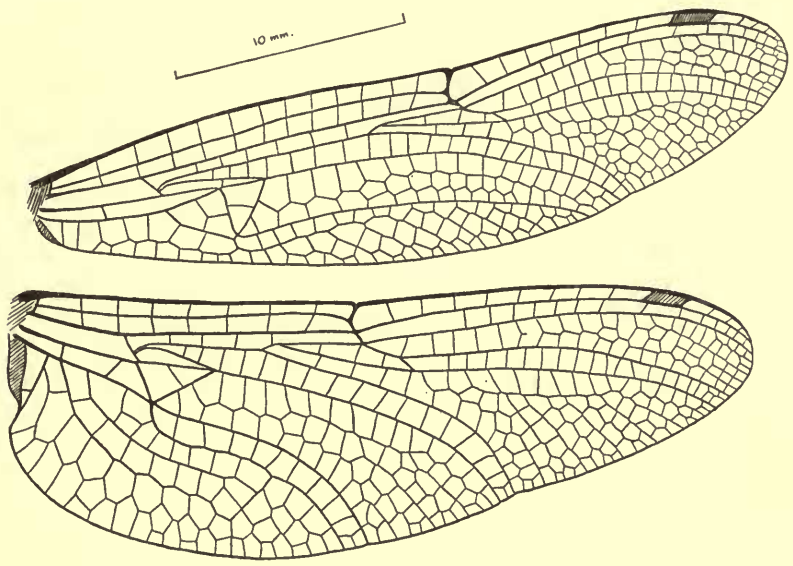

FIG. 3. *Guadalca insularis* gen. et sp. n. ♂ wings.

black teeth. Wings (Text-fig. 3) hyaline or faintly brownish, ♂ with a pale, golden-yellow area at base of hind wing, not extending beyond the basal cubital cross-vein, and with a trace of this colour at extreme base of fore wing. ♀ with veins lightly margined with brownish. Triangles in both wings divided, subtriangle in hind wing present. Antenodal cross-veins 10–12 in fore wing, 7–8 in hind wing. Arculus at about the level of the second antenodal in both wings, oblique, branches separate or arising at a point, in the posterior half of arculus. Nodus in fore wing situated distad from middle of wing. Stigma in both wings short, rhomboidal, about twice as long as wide. Anal loop rather feebly developed, three cells wide at apex; two rows of cells between 2A and margin of hind wing in ♂, three rows in ♀.

Type-species, ***Guadalca insularis*** sp. n.

This genus appears most closely related to *Antipodochlora* Fraser (New Zealand), from which it differs in its narrower frons, the greater number of antenodal cross-

veins in both wings, the more distally situated nodus of the fore wing and the less well-developed anal loop of the hind wing. *Anticordulia* Needham and Bullock (Chili) is also closely related but differs in the more robust body, longer legs, nodus of fore wing about mid-way, fewer antenodals, and in the hind wing generally no second cubital cross-vein (subtriangle absent) and three rows of cells between 2*A* and the wing margin. It should be remembered that in the group of Corduline genera to which these belong, the second cubital cross-vein in the hind wing tends to be unstable and too much reliance should not be placed in it as a generic character in single specimens.

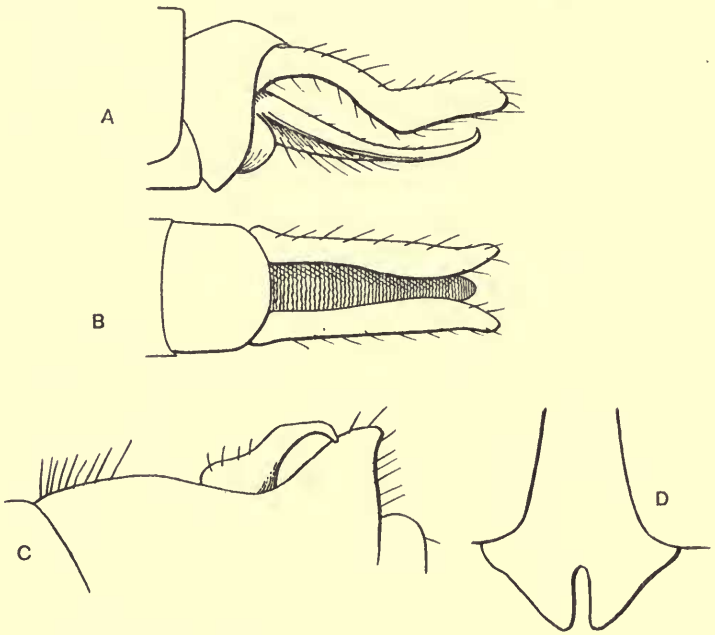

Fig. 4. *Guadalca insularis* gen. et sp. n. ♂, ♀. (A), ♂ anal appendages, left lateral; (B), ♂ anal appendages, dorsal; (C), ♂ genitalia, second segment, right lateral; (D), ♀ vulvar lamina, ventral.

Guadalca insularis sp. n.
(Text-figs. 3–4)

Tapenanje, 10–23.xii.1953, 9 ♂, 1 ♀.

♂. Head with vertex black with a greenish lustre. Frons with shining, metallic greenish-black triangles, sides and lower margin dull yellowish. Clypeus dull yellowish, labrum piceous, with a small orange spot. Labium dull yellowish.

Thorax metallic greenish, with a coppery sheen, a narrow brownish stripe on each side of and adjoining the median carina. Legs not unusually long, reddish-brown, with black spines and teeth : tarsi dark brown.

Wings (Text-fig. 3) hyaline or slightly smoky yellowish, and with a small patch of pale golden-yellow at the base of the hind wing, not extending beyond the basal cubital cross-vein. Venation black, stigma reddish-brown.

Abdomen slender (including appendages a little shorter than hind wing), slightly constricted at the third segment, then gradually dilating again to the seventh segment. Segment 1 yellowish-brown, darker above ; 2 yellowish-brown, with a dorsal patch of greenish-black. Remaining segments piceous above, with a purplish metallic sheen ; 3–9 with a narrow, dull orange apical margin, apical lateral margins dull orange, which colour also appears to a lesser degree in the basal lateral angles of segments 4–7. Segment 10 blackish. Ventral surface of abdomen dull yellowish with darker margins.

Genitalia of the second segment (Text-fig. 4c) with the anterior lamina small, transverse, not projecting beyond the margins of the segment in side view, dull yellowish-brown. Hamules prominent, broad at base, tapering to slender, moderately hooked apices, about as long as the genital lobes. The latter are stout, triangular, with rounded apices. Superior anal appendages (Text-fig. 4A, B) black, more than twice as long as tenth segment, slender, cylindrical from above, with divergent apices. From the side they are slightly down-curved to just beyond the middle, then slightly angled upwards and straight. Inferior appendix yellowish, almost as long as superiors, in dorsal view forming a narrow triangle with upturned apex.

♀. Coloured much as in male but rather darker. Venation bordered with yellowish-brown. Orange markings on abdomen less extensive. Anal appendages blackish. Vulvar lamina (Text-fig. 4D) triangular, with a narrow, U-shaped, median excision.

Abdomen with appendages, ♂, 32–34 mm., ♀, 33.5 mm.

Length of hind wing, ♂, 30–32 mm., ♀, 35 mm.

Family Libellulidae

Tapeinothemis boharti Lieftinck.

(Text-fig. 5)

Tapenanje, 10–23.xii.1953, 13 ♂, 13 ♀.

This species was described from a single female from Florida Island and I am therefore giving a supplementary description of the points in which the male differs. (Adult.) Centre of dorsum of synthorax with white pruinescence. Abdominal segments 2–8 densely coated with white pruinescence above. In less mature males, the dorsum of segments 2–7 is shining metallic blue-black, only partly obscured with pruinescence, 8–10 dull black. Segment 1 is shining black above, with a lemon-yellow triangle in each apical angle. In side view, segments 2–3 are lemon-yellow towards the bases. Genitalia of second segment and appendages as figured. One male has been marked as *allotype*.

Distribution. Solomon Islands.

Agrionoptera insignis insularis Kirby

Tapenanje, 10–23.xii.1953, 1 ♂.

Honiara, 5–9.x.1953, 1 ♀.

Distribution. Solomon Islands.

Protorthemis woodfordi (Kirby)

Honiara, 5–9.x.1953, 1 ♂.
Tapenanje, 10–23.xii.1953, 6 ♂, 1 ♀.
DISTRIBUTION. Solomon Islands.

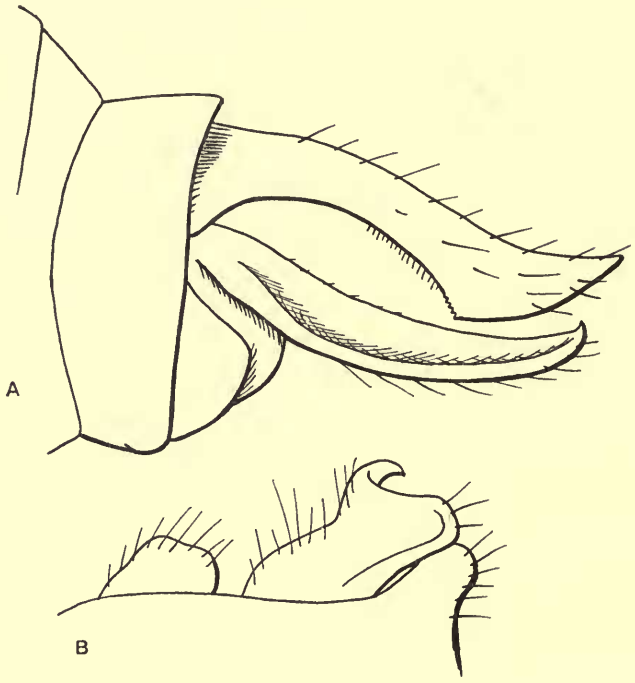

FIG. 5. *Tapeinothemis boharti* Lieftinck ♂. (A), anal appendages, left lateral; (B), genitalia, second segment, right lateral.

Orthetrum villosovittatum bismarckianum Ris

Honiara, 5–9.x.1953, 1 ♀.
Tapenanje, 10–23.xii.1953, 5 ♂, 3 ♀.
DISTRIBUTION. Bismarck Archipelago, Solomon Islands, Amboina.

Diplacodes trivialis (Rambur)

Honiara, 10–14, 19–29.ix.1953, 4 ♂, 1 ♀.
DISTRIBUTION. Seychelles, Asia, Philippine Islands, East Indies, Celebes, New Hebrides, Solomon Islands, Bismarck Archipelago, Australia, Fiji.

Neurothemis stigmatizans brahmina (Guerin)

Honiara, 5–9.x.1953, 5 ♂, 3 ♀.
Tapenanje, 10–23.xii.1953, 17 ♂, 7 ♀.
DISTRIBUTION. New Guinea, Aru Islands, Bismarck Archipelago, Solomon Islands, New Hebrides, Union Islands.

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A STUDY OF THE CHIRONOMIDAE (DIPTERA) OF AFRICA SOUTH OF THE SAHARA

PART III

PAUL FREEMAN

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 5 No. 9
LONDON: 1957

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BY

PAUL FREEMAN

Pp. 321–426 ; 1 *Plate* ; 18 *Text-figures*

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A STUDY OF THE CHIRONOMIDAE (DIPTERA) OF AFRICA SOUTH OF THE SAHARA

PART III

By PAUL FREEMAN

CONTENTS

SYNOPSIS

Parts I and II of this Study were published as Nos. 1 and 7 of Vol. 4 of the *Bulletin of the British Museum* (*Natural History*) (1955–56). Part III continues the description of the Chironomid fauna of Africa south of the Sahara (Ethiopian Zoogeographical Region) and deals with the first half of the tribe Chironomini of the subfamily Chironominae, that is, with the large genus *Chironomus* and its allies, which are the genera including species that normally have two spurs on the posterior tibiae.

Following the classification used by F. W. Edwards in 1929, the species described here would represent the first half of the genus *Chironomus*, but the classification adopted in the present paper has reduced the extent of this large genus and uses the principles given in Part II for its restriction. Seven genera are recognized in this group for the African fauna, the genus *Chironomus* being used with seven subgenera. All the genera described by Kieffer and Goetghebuer have been identified with the exception of *Kribiobius* Kieffer which may well have been based on the female of a species of Tanytarsini (= Calopsectrini of Townes). As in the

Orthocladiinae many species resemble Palaearctic species, but there is more variety in this subfamily, perhaps because of its larger size and preference for warmer water habitats. Keys are given to genera, subgenera and species; more than 100 species are described, 25 of which are new, and notes are given on 12 species of *Chironomus* (*Cryptochironomus*), which were described by Kieffer from females and which cannot be recognized from the descriptions.

INTRODUCTION

Parts I and II of this Study were published as Nos. 1 and 7 respectively of Vol. 4 of the *Bulletin of the British Museum* (*Natural History*) (1955–56). Reference should be made to Part I for a general introduction to the Studies and an historical survey of previous work on the African species; methods of collection and examination, structure, notes on distribution, a key to subfamilies and other points of interest are also covered in that Part. In addition, Part I deals with the species of the subfamilies Tanypodinae, Diamesinae and Clunioninae and mentions the Podominae, whilst in Part II the species of the subfamilies Orthocladiinae and Corynoneurinae are described. Part III describes the species and genera of the first half of the large subfamily Chironominae, that is the genus *Chironomus* and its allies, which are the genera normally with two spurs on the posterior tibia. It is hoped to complete the subfamily Chironominae in the next Part.

Since publication of Part II, I have received collections from Dr. B. Stuckenberg, Natal Museum, which he has made both in Natal and also in Madagascar, from Dr. P. S. Corbet made in Uganda and from Dr. B. McMillan of the Nigerian Health Department. Mr. E. T. M. Reid has moved from Sudan to S. Rhodesia and has continued sending me collections from this new locality, both collected by himself and by Mr. Smithers, Agricultural Entomology Laboratory, Salisbury. I should like to thank all these gentlemen for their assistance in sending me material for study.

SUBFAMILY CHIRONOMINAE

Eyes with dorsal narrow portion (except in *Pseudochironomus* and in one or two other aberrant, non-African genera); male antennae plumose and with 11–14 segments, female antennae with 5–7 segments. Pronotum sometimes collar-like, but often reduced and not visible from above, postnotal furrow distinct. Anterior tibia terminating on the inner side in a " scale " which may be low and rounded or oval and more produced or it may carry a bristle-like spur (the non-African genus *Pseudochironomus* has a conspicuous spur on this tibia); middle and posterior tibiae normally with two apical combs composed of basally fused spinules, the tibial spurs are associated with these combs but one or both spurs may be reduced or absent, combs may be fused or separate. Anterior basitarsus at least as long as, and nearly always longer than, the tibia (L.R. more than 1). True base of M_{3+4} never present, R_{2+3} present but never connected to R_1 by a cross-vein; costa almost always ending abruptly at tip of R_{4+5}. Male hypopygium not inverted, styles directed rigidly backwards and without terminal spine, coxites usually with two or more basal appendages (reduced and occasionally absent in *Chironomus* subg. *Cryptochironomus*).

As already pointed out in previous Parts, the majority of the species of Chironomidae from Africa south of the Sahara fall into this subfamily, a fact which is in accord with the work of entomologists in the Palaearctic Region, who have found that species of this subfamily are especially typical of warm water environments. In the Orthocladiinae (Part II) it was shown that the fauna closely resembled the Palaearctic fauna and the same is true of the Chironominae. Many of the species fall into groups which have been recognized in the Palaearctic fauna, but as might be expected, there is more variety and the emphasis is often different, that is, the commoner Palaearctic genera are not necessarily those which are the most abundant in Africa.

Kieffer was the first author to split up the old genera *Chironomus* and *Tanytarsus* and in his paper on the African Chironomidae (1921, *Ann. Soc. ent. France*, **90** : 1–56) he recognized over 70 genera, though not all with African representatives. Of the 39 genera in which he placed the African species in this and the two succeeding parts of the series, 25 are described as new. The majority of the new genera begin with one or other of the prefixes " *Kribi-* " and " *Nilo-*," depending on whether they were described from species found at Kribi in the French Cameroons or from the Nile in the southern part of the Sudan. Goetghebuer in his papers on the African Chironomidae was only able to recognize three of these new genera and he has himself added a further three. A fourth genus, *Kribioxenus* Kieffer, has been used by Goetghebuer, Edwards and Townes for some holarctic species, but, as shown below, this is incorrect and the species should really be placed in *Nilothauma* Kieffer. The recognition and re-definition or the placing in synonymy of these genera is one of the main problems of this Study.

As a primary character, Kieffer used the presence of macrotrichia on the wing membrane to split off " Groupe *Tanytarsus* " which included *Pentapedilum*. The genera with bare wings which he termed " Groupe *Chironomus* ", were divided into major groupings by the number of spurs on the posterior tibiae. Genera were then separated to a great extent on the detailed structure of the combs, spurs and pulvilli, whilst antennal segmentation of one or both sexes, male hypopygial structure and wing pattern were used as subsidiary characters. Some of these characters are trivial and certainly not of generic value, others, especially characters of pulvilli do not exist. For example, he stated that in *Cladopelma* and *Stenochironomus* the pulvilli were branched on the median side, in *Dicrotendipes* they were narrow and half as long as the claws, whilst in *Chironomus* they were large and not branched. I have made stained preparations of pulvilli of species belonging to these genera and known to Kieffer and can see no differences between the pulvilli of any of them, and I am forced to conclude that he must have examined them from different aspects or under different conditions. On the other hand he is quite correct in stating that the pulvilli in *Polypedilum* are split longitudinally.

Edwards (1929), *Trans. ent. Soc. Lond.* **77** : 279–430) has laid the foundations of the modern classification of the subfamily, but as in the Orthocladiinae, he went to the opposite extreme to Kieffer and used very large genera which he subdivided into subgenera, species groups and series. Although Edwards's main concepts of groups have been accepted by later authors, few have accepted his large genera which have

been found to be unwieldy and difficult to use. One of the great difficulties in classifying the subfamily is the presence of intermediate species linking many of the groups, but even so, I think that it is possible to achieve a greater degree of subdivision than was advocated by Edwards. The classification which I am offering is probably nearer to that of Goetghebuer (1937, *in* Lindner, *Flieg. Pal. Reg.* **3** (13*c*)), but there are a number of differences of opinion. I do not go as far as Townes (1945, *Amer. midl. Nat.* **34** : 1–206) in splitting into genera, nor do I agree with all of his radical changes in relationships.

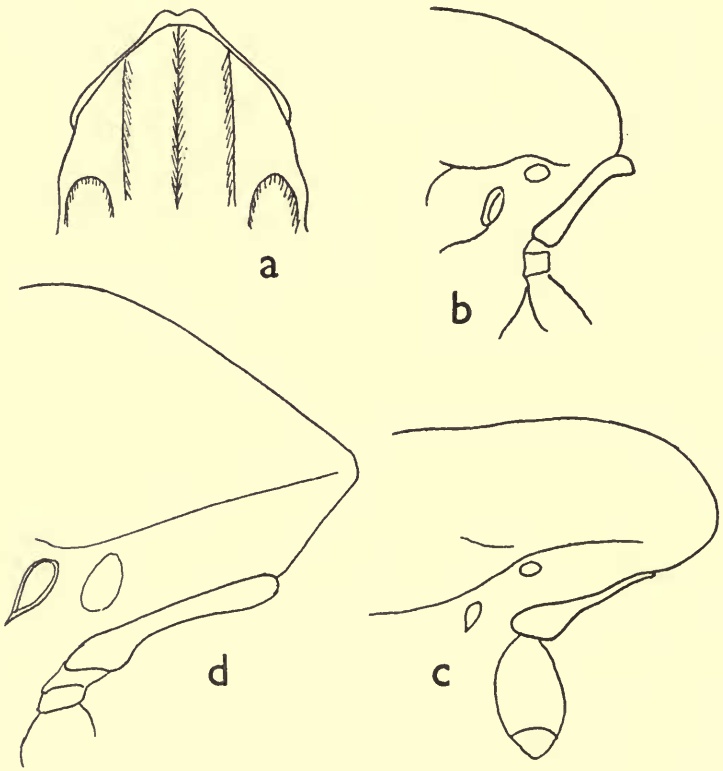

FIG. 1. Anterior halves of thoraces to show prothorax. (*a*) *Chironomus caffrarius*, dorsal view ; (*b*) the same in lateral aspect ; (*c*) *Stenochironomus atroconus*, lateral aspect ; (*d*) *Collartiella hirsuta*, lateral aspect.

Edwards (1929) was the first author to indicate the importance to classification of the size of the prothorax and he used it as one of the main characters for splitting his large genus *Chironomus* into subgenera. Goetghebuer and Townes have both followed Edwards in the use of this character.

KEY TO TRIBES OF SUBFAMILY CHIRONOMINAE

Wing membrane without macrotrichia, or if present then squama with marginal fringe of long hairs ; cross-vein r-m definitely oblique to direction of vein R_{4+5} CHIRONOMINI

Wing membrane with macrotrichia at least towards the apex, squama without fringe ; cross-vein r-m nearly parallel to and practically continuous with R_{4+5} TANYTARSINI (= Calopsectrini of Townes) (see later part)

TRIBE CHIRONOMINI

Only one half of this tribe is dealt with in this Part, a later Part will describe species both in the other half and in the Tanytarsini.

Apart from a few small and aberrant genera, the tribe was divided by Kieffer into two groups depending on whether the posterior tibia had one or two spurs in association with the combs. This method of dividing the bulk of the species was also adopted by Edwards and Goetghebuer and for most species it is perfectly satisfactory. Genera can then be split off on the development of the prothorax, size of pulvilli and presence of front tibial spur.

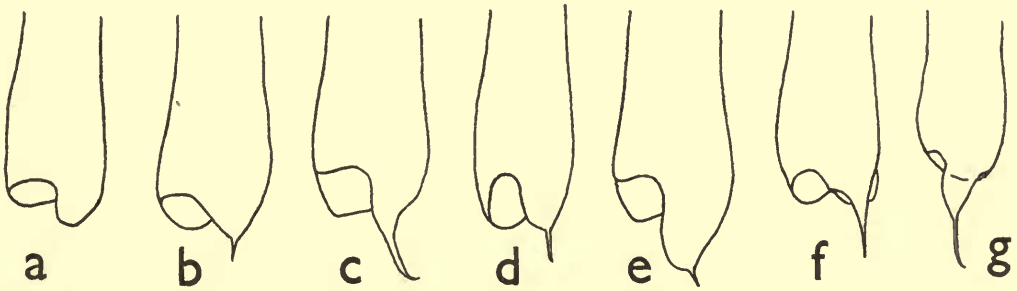

FIG. 2. Apices of anterior tibiae. (*a*) *Chironomus pulcher* ; (*b*) *C.* (*Endochironomus*) *woodi* ; (*c*) *Nilodosis fusca* ; (*d*) *Henrardia quadrispinosa* ; (*e*) *Stenochironomus atroconus* ; (*f*) *Paratendipes crosskeyi* ; (*g*) *Nilothauma pictipenne*.

However, several genera of the two-spurred group contain species in which the spurs are reduced to one or are even completely absent, but which seem otherwise to be quite typical ; also, in *Collartiella* the number of spurs may be different on the two sides of the same specimen. It might be thought advisable to choose other and more reliable characters to replace the spur number for the main division of the group, but no other character seems to divide the genera into such natural series. For instance, the great reduction of the prothorax seen in *Stenochironomus* a genus with two spurs, is also shown to some extent by *Microtendipes* which has only one spur. Other characters such as male hypopygial structure and presence of acrostichal bristles do not bear out a close relationship of the two genera and it seems more likely that the resemblance is caused by convergence.

I am therefore adopting Kieffer's original method of dividing the tribe, but I have found it to be necessary to modify some of the definitions because of the presence of species more or less intermediate between genera and because of the presence of single-spurred species in genera normally two-spurred. Further study has shown